11 0060045 3697

WYNNEWOOD REFINING™
A CVR Energy, Inc. Company

January 18, 2017

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

AI / AI / CO

Mr. Eddie Terrill, Director
Oklahoma Department of Environmental Quality
Air Quality Division
707 North Robinson
P.O. Box 1677
Oklahoma City, OK 73101-1677

Re: **2016 RATA Test Results**
Hydrocracker Flare GC, South Flare GC, West Flare GC, and Fuel Gas Drum GC
Permit No. 2007-026-TVR (M-16)

Dear Mr. Terrill:

The purpose of this letter is to transmit a copy of the 2016 RATA test results for the Hydrocracker Flare GC, South Flare GC, West Flare GC, and Fuel Gas Drum GC. The RATA tests were conducted on November 29, 2016, and demonstrated compliance for all four sources.

If have any questions please contact David Heller at (405) 665-6526.

Sincerely,

Curtis Miles
Environmental Manager

cc: Mr. John Blevins, EPA, Region 6, Compliance Assurance and Enforcement Division

DENOVO

December 12, 2016

Mr. David M. Heller
Environmental Engineer III
Wynnewood Refining Company
906 South Powell Street
Wynnewood, Oklahoma 73098

Re: Hydrocracker Flare – Yokogawa GC 8000 H_2s Gas Chromatographs Annual RATA Performance Test, CVR Energy, Wynnewood Refining Company, Wynnewood, Oklahoma

Dear Mr. Heller:

Enclosed are 3 hard copies and 1 copy on CD of the final test report for the Hydrocracker Flare – Yokogawa GC 8000 H_2s Gas Chromatographs Annual RATA Performance Test at the CVR Energy. – Wynnewood Refinery facility located in Wynnewood, Oklahoma.

If you have any questions or comments, please do not hesitate to call us at (281) 251-0399. DeNovo appreciates this opportunity and we look forward to continuing our successful and lasting relationship.

Sincerely,

Louis M. Esposito

Louis M. Esposito
Director
LME/th

17902 East Strack Drive, Spring, TX 77379
281.251.0399, http://www.denovogt.com

DENOVO

WYNNEWOOD REFINING™

A CVR Refining, LP Company

HYDROCRACKER FLARE
YOKOGAWA GC 8000 H_2S GAS CHROMATOGRAPH

2016 ANNUAL RATA PERFORMANCE TEST

CVR ENERGY – WYNNEWOOD REFINERY

WYNNEWOOD, OKLAHOMA

Final Report
December 12, 2016

Project # 5281.03.05

17902 East Strack Drive, Spring, TX 77379
281.251.0399, http://www.denovogt.com

SUMMARY

DeNovo Global Technologies, Inc. (DeNovo) conducted the Annual Relative Accuracy Test Audit (RATA) on the plant Hydrocracker Flare GC, H_2S Continuous Emissions Monitoring Systems (CEMS) associated with the CVR Energy. – Wynnewood Refining Company (WRC) petroleum refinery located in Wynnewood, Oklahoma. Annual certification testing was conducted on the Hydrocracker Flare Yokogawa GC 8000 H_2S Gas Chromatograph for the pollutant Hydrogen Sulfide (H_2S). The tests were performed to provide documentation of compliance with quality assurance provisions for the CEMS and process units as governed under Federal regulations associated with 40 CFR Part 60, 40 CFR Part 63 along with the facility state operating permit.

Testing was conducted on November 29, 2016. The test procedures were performed in accordance with 40 CFR, Part 60, Appendix B, utilizing a modified EPA Reference Methods 15 for the determination of H_2S. This report presents the results of that testing.

Mr. David M. Heller of Wynnewood Refining Company (WRC) was the project coordinator. The team leader for DeNovo was Mr. Louis Esposito.

BASED ON THE TEST RESULTS, THE HYDROCRACKER FLARE YOKOGAWA GC 8000 H_2S GAS CHROMATOGRAPHS PASSED THE 2016 ANNUAL RELATIVE ACCURACY TEST AUDIT.

Louis M. Esposito
Director
DeNovo Global Technologies, Inc

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1.0 INTRODUCTION

DeNovo Global Technologies, Inc. (DeNovo) conducted the Annual RATA Performance Test (RATA) for the Hydrocracker Flare Yokogawa GC 8000 H_2S Gas Chromatograph associated with the WRC operations in Wynnewood, Oklahoma.

The H_2S Annual Performance RATA series consisted of sixteen samples taken within >3 <6 hours for each of the test series.

The subsequent sections of this report present results for the test as follows:

2.0 — Test Methods and Equipment Summary
3.0 — Summary of Test Procedures and Results

The appendices provide documentation and supporting data. The appendices are organized as follows:

Appendix A — Emission Performance RM Calibration and Run Test Data
Appendix B — Operational Data
Appendix C — Gas Calibration Certificates/Support Documentation
Appendix D — Example Calculations
Appendix E — Quality Assurance

2.0 TEST METHODS AND EQUIPMENT SUMMARY

The test program was designed to provide data for documentation of compliance with federal regulations associated with NSPS Subparts and state operating permit requirements related to certification of unit emissions. Specifically, testing for the WRC facility consisted of sampling the Hydrocracker Flare Yokogawa GC 8000 Gas Chromatograph for H_2S. The following is a brief description of the units:

Hydrocracker Flare H_2S CEMS:

H_2S Analyzer – Yokogawa Gas Chromatograph
Model: GC8000
Serial No: KGC - 11727
Span Range- 0 – 300 ppm H_2S
Plant I.D No.: 1003887
Range: 300 ppm

The Plant Data Acquisition System (DAS) is managed by a Total Distributive Control (TDC) processor which compiles process data points from the units into the Plant History Database (PHD). The PHD system provides one minute averaged data.

3.0 SUMMARY OF TEST PROCEDURES AND RESULTS

A summary of the RATA test series is given in Table 3-1 below.

3.1 Hydrocracker Flare Emission Performance Test

RATA testing was performed on November 29, 2016 on the Hydrocracker Flare Yokogawa GC 8000 H_2S Gas Chromatographs. A minimum of sixteen (16) test runs were used from sample bag injections for the unit test series. Testing was performed in accordance with EPA Method15 (modified), gas chromatography sampling and analytical test procedures to calculate the average for the RA determination for the unit. The RM average was then compared with the CEM averages to determine the analyzer relative accuracy. The RA Performance Specification for H_2S analyzer specifies the CEMS to be within 20% of the reference method, or 10% of the emission standard (162 ppm).

Based on the test results, the Hydrocracker Flare Yokogawa GC 8000 H_2S Gas Chromatograph Passed the Annual RATA certification.

3.2 Sampling and Analytical Procedures

3.2.1 RM - Gas Chromatography Instrumentation

The compound to be analyzed for was hydrogen sulfide (H_2S). The instrument used for the analyses was a SRI 8610C equipped with a flame photometric detector (FPD). The detector temperature was set at 125^{0}C, and a sample flow of 70 ml per minute. Column temperature was set at 45^{0}C. A 1.0 - milliliter sample loop mounted on an automatic sampling valve was used to inject both calibration and sample gases on to two Chromasil 310 3-meter x 1/8" packed Teflon columns configured in series.

3.2.2 GC Calibration Procedure

The GC was calibrated using $H_2S/COS/CS_2$ certified gas. A 7-point curve was obtained by diluting the standard with nitrogen gas to 100% and 50% of a 488.2 ppm gas standard and also diluting the standard with nitrogen gas to 100%, 50%, 25%, 12.5% and 0% of the 154.7 ppm gas standard concentration. The dilutions were accomplished within the precision syringe by taking in a specified amount of standard and then diluting with the nitrogen. Runs were done at each calibration point until three consecutive runs were within 10% of each other with the final analysis point being added to the curve. Certified H_2S standards within the range of the facility operating conditions were injected to confirm calibration.

3.2.3 GC Sampling Procedure

The flare gas samples measured by the Yokogawa GC 8000 H_2S Gas Chromatographs were sampled and measured according to the requirements and procedures of EPA Reference Method 15 with the following two modifications. Gas samples were collected in Tedlar bags instead of direct injection and the GC was calibrated by means of certified gas standards versus permeation tubes. Each Tedlar bag was purged with nitrogen prior to use and then filled directly from the Yokogawa fuel gas analyzer sample port feed tap. The sample port taps were fitted with 1/4" stainless swag-lok fittings and connected to Teflon tubing. The sample line was purged prior to each sample. The labeled tedlar bags were then immediately brought to the RM GC for immediate analysis via direct injection. No dilutions of the sample were necessary since the established calibration table covered the appropriate range.

3.2.4 GC Data Collection and Integration

The results were integrated using Peak Simple GC software, with data analysis specific to H_2S concentrations reported in parts per million (ppm)

Table 3-1: Hydrocracker Flare Yokogawa GC 8000 H2S CEMS Rata

Run No.	RM H_2S (ppm)	CEMS H_2S (ppm)
1.	108.56	116.03
2.	109.89	111.68
3.	99.70	112.93
4.	92.10	111.68
5.	104.54	113.50
6.	99.46	112.60
7.	98.99	107.09
8.	118.30	116.49
9.	95.00	107.55
10.	92.97	105.72
11.	92.10	104.58
12.	99.67	104.12
13.	97.79	107.67
14.	109.38	118.54
15.	114.15	112.02
16.	107.43	102.52
Avg	102.50	110.30
Mean Difference	-7.7931	
StdDe	6.6997	
ConC.	3.5693	
RA%	11.1	
Ac/Std %	7.0	
Status	PASS	

H_2S shall not exceed 20.0 percent of the mean value of the reference method test data or 10 percent of the Relative Standard, whichever is greater

APPENDIX A - Hydrocracker Flare Yokogawa GC 8000 H_2S Test Data

DeNovo Global Technologies, Inc. *ENVIRONMENTAL ENGINEERING AND TESTING SERVICES*

17902 East Strack Drive
Spring, TX 77379

Phone: 281-251-0399
Fax: 281-251-1301

CLIENT:	CVR Energy	DATE:	11/29/2016
LOCATION:	Wynnewood, Oklahoma	PROJECT NO.:	5281.03.05
LOAD:	N/A	PERSONNEL:	Louis Esposito
ANALYZER:	Yokogawa GC8000	SOURCE:	Hydrocracker Flare
I.D.:	KGC - 11727	APPLICABLE STANDARD:	162

RELATIVE ACCURACY TESTING SUMMARY - Hydrocracker Flare H2S ANALYZER

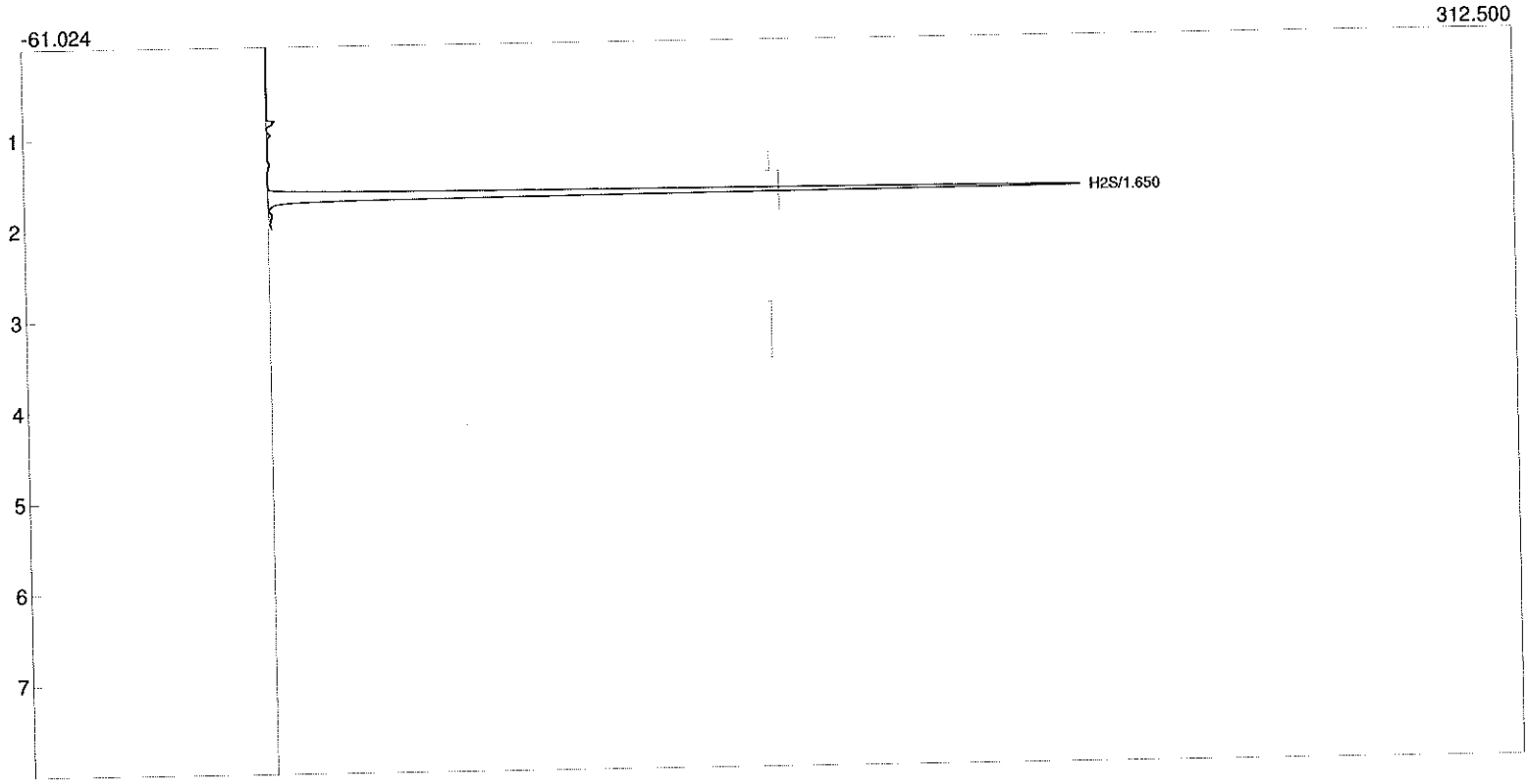
The table below contains the results of testing and calcultions performed on the date(s) listed.
The testing was performed in accordance with 40 CFR Part 60, Appendix B, Performance Specification 7

Hydrocracker Flare			
TIME	RM	CEMS	Dif
9:32	108.56	116.03	-7.47
9:46	109.89	111.68	-1.79
9:55	99.70	112.93	-13.23
10:06	92.10	111.68	-19.58
10:15	104.54	113.50	-8.96
10:26	99.46	112.60	-13.14
10:51	98.99	107.09	-8.10
11:09	118.30	116.49	1.81
11:18	95.00	107.55	-12.55
11:47	92.97	105.72	-12.75
11:58	92.10	104.58	-12.48
12:08	99.67	104.12	-4.45
12:20	97.79	107.67	-9.88
12:46	109.38	118.54	-9.16
13:15	114.15	112.02	2.13
13:22	107.43	102.52	4.91
Average	**102.50**	**110.30**	**-7.79**

RM AVERAGE:	102.5019	ppmv
CEMS AVERAGE:	110.2950	ppmv
ARITHMETIC MEAN:	-7.7931	
STANDARD DEVIATION:	6.6997	
CONFIDENCE COEFFICIENT:	3.5693	
ACCURACY VS. RM AVERAGE:	**11.1**	%
ACCURACY VS. APPLICABLE STANDARD:	**7.0**	%

THE ABOVE DATA CERTIFIES THAT THE C.E.M. FOR WHICH THIS DATA IS PROVIDED PASSES ___X___, FAILS _____ THE RELATIVE ACCURACY TEST

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
ontrol filename: C:\peak444-64bit\H2swynn.con
Data file: 5281_305_39.CHR ()



Component	Retention	External	Units
H2S	1.650	108.5652	
		108.5652	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
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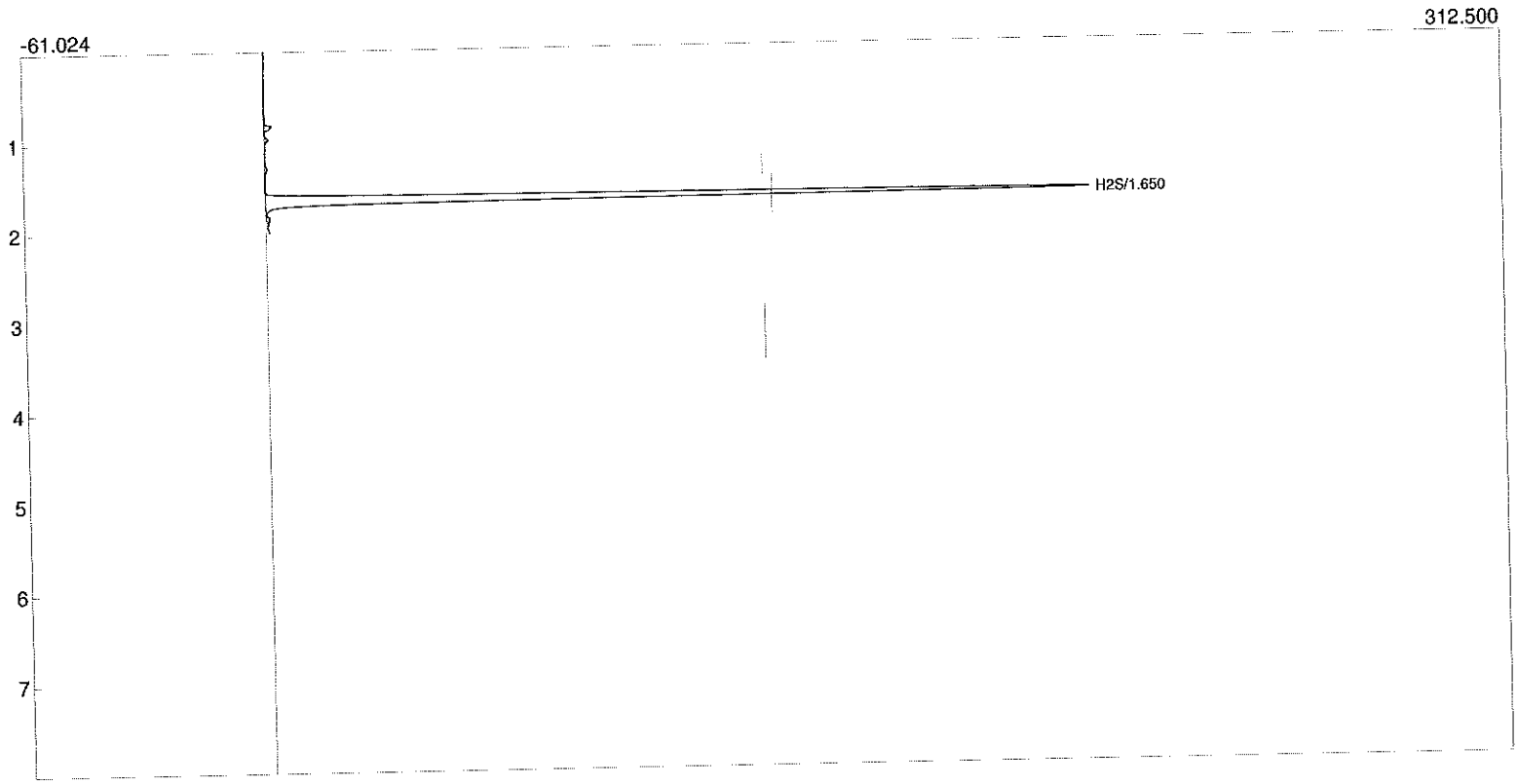

Component	Retention	External	Units
H2S	1.650	109.8924	
		109.8924	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
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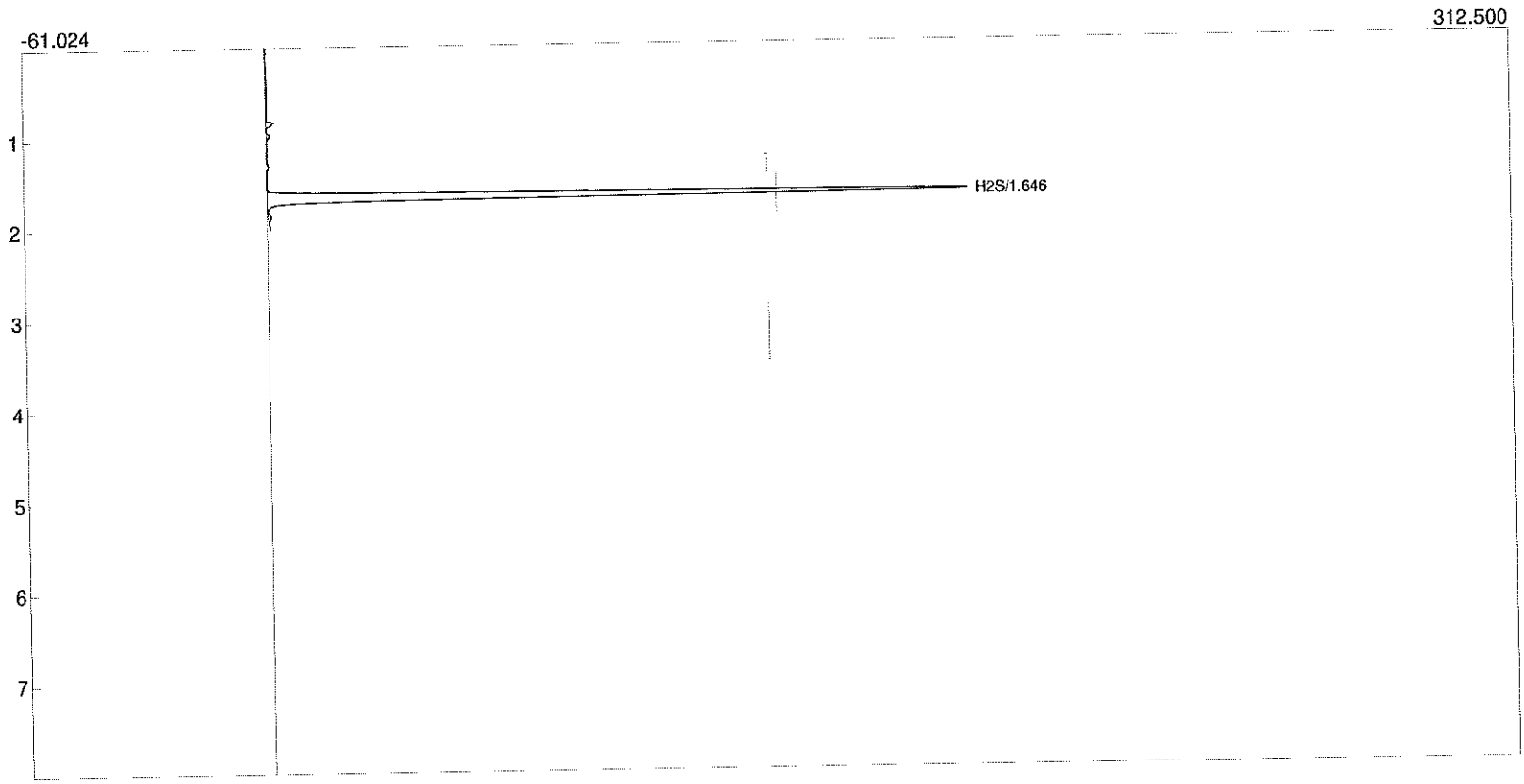

Component	Retention	External	Units
H2S	1.646	99.7057	
		99.7057	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
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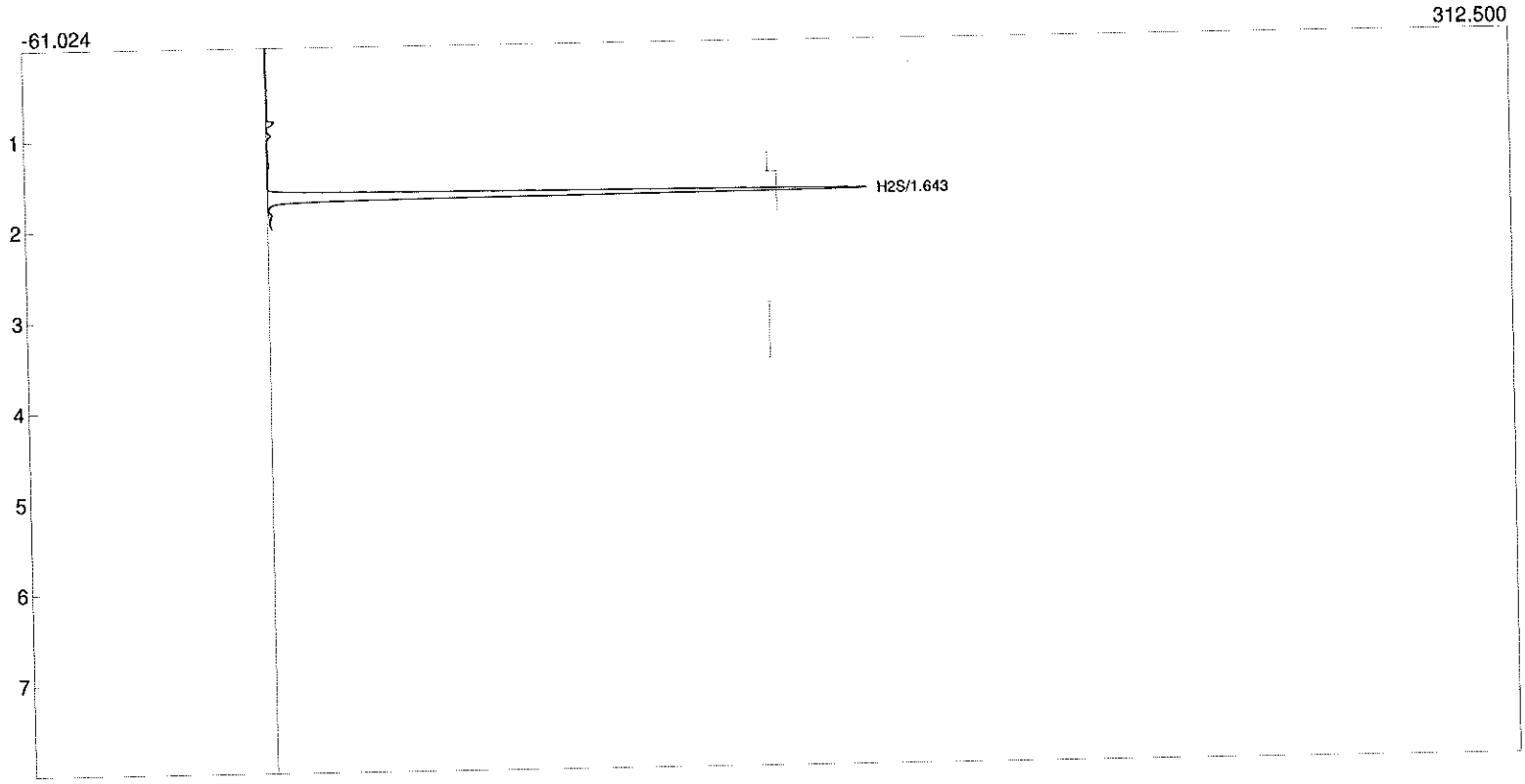

Component	Retention	External	Units
H2S	1.643	92.1074	
		92.1074	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
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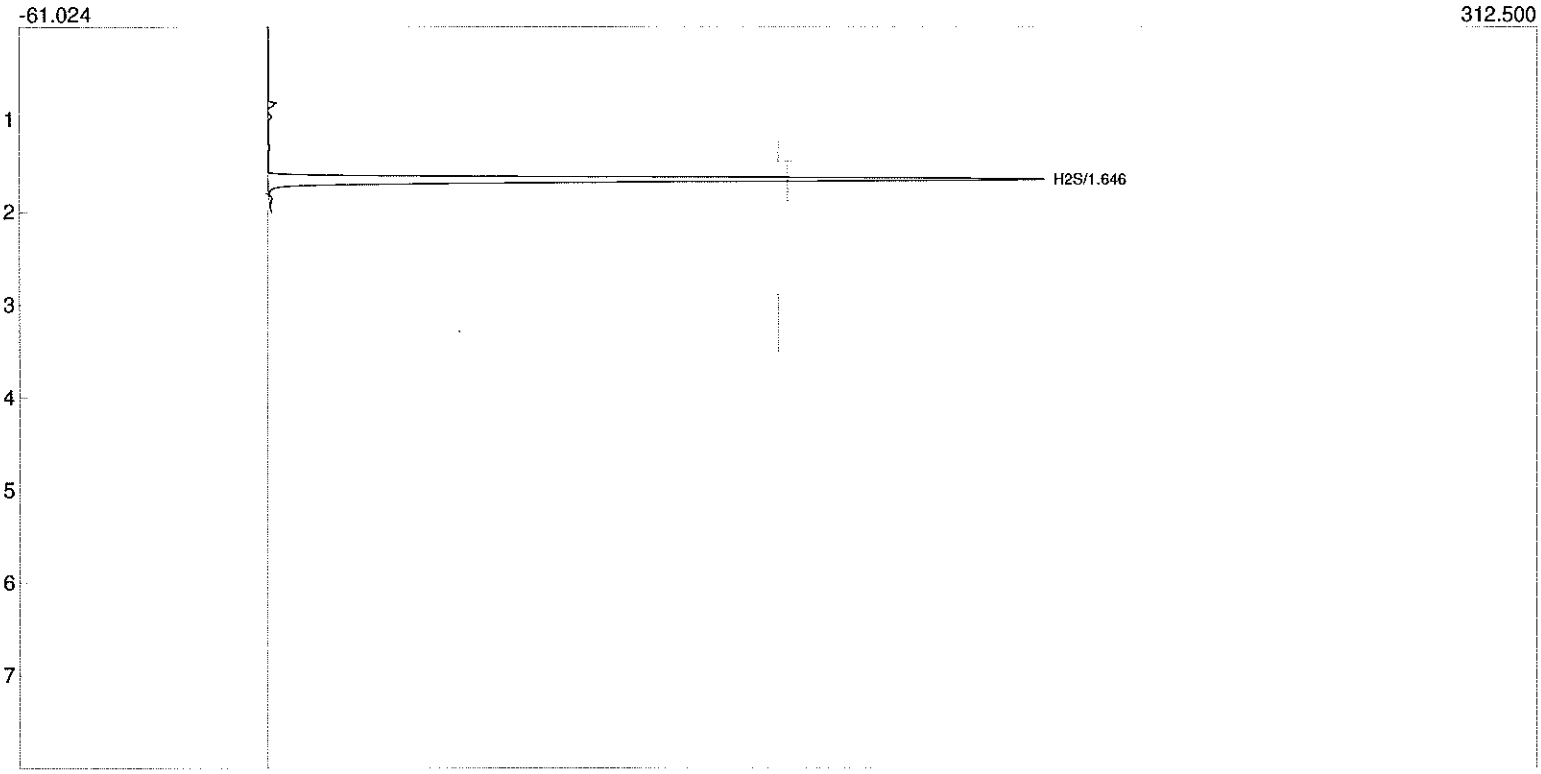

Component	Retention	External	Units
H2S	1.646	104.6493	
		104.6493	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
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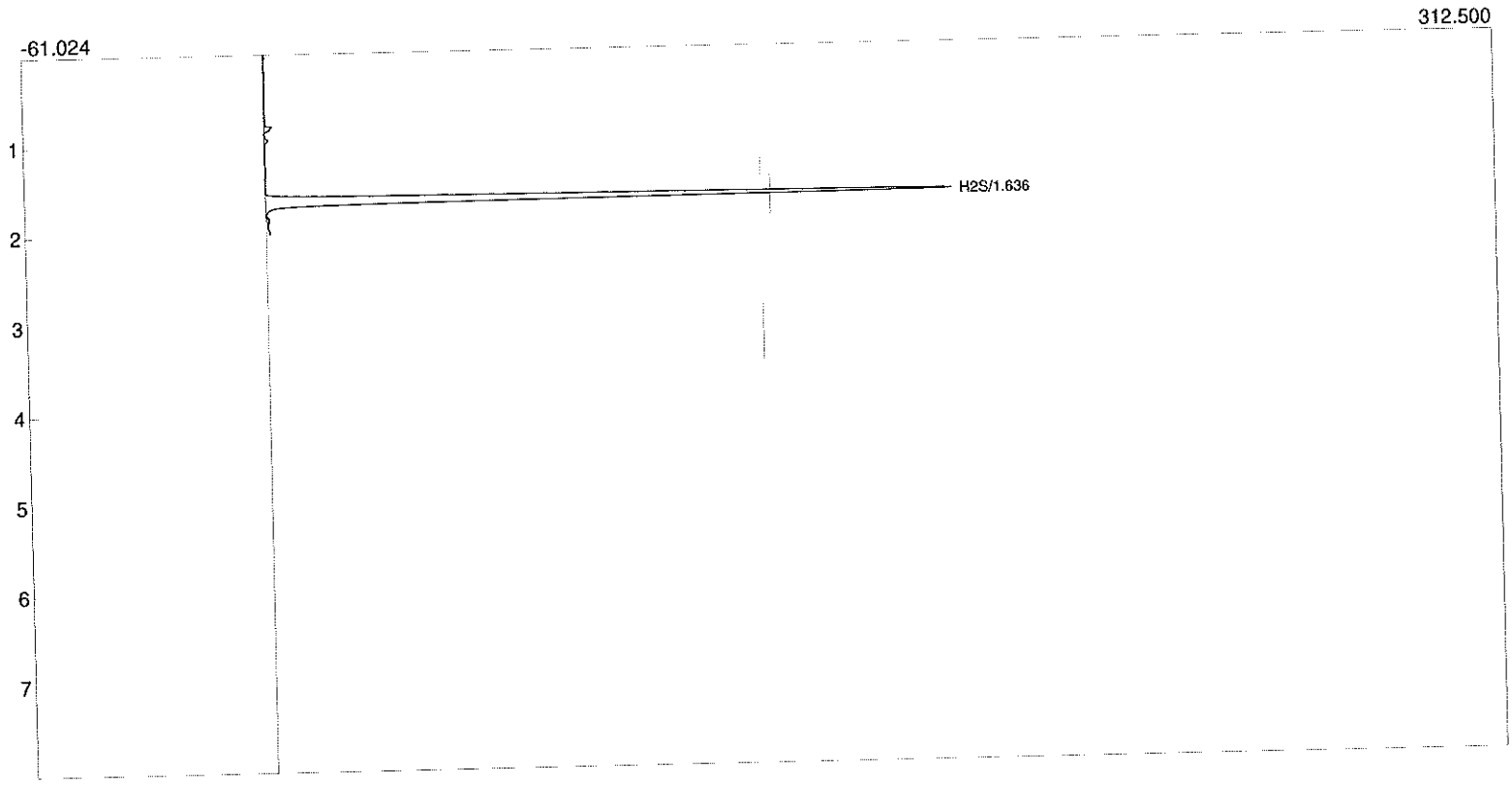

Component	Retention	External	Units
H2S	1.636	99.4612	
		99.4612	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
ontrol filename: C:\peak444-64bit\H2swynn.con
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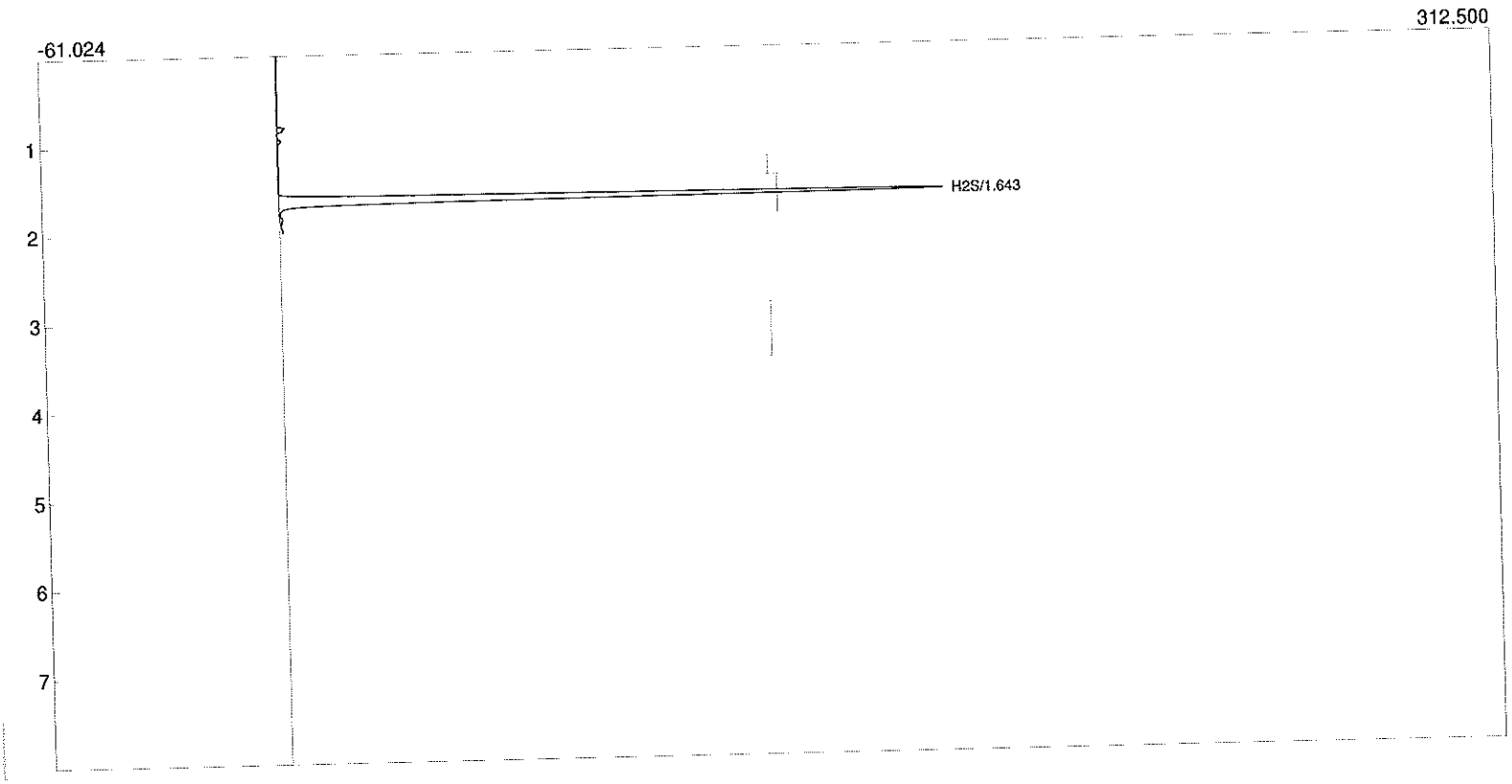

Component	Retention	External	Units
H2S	1.643	98.9943	
		98.9943	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
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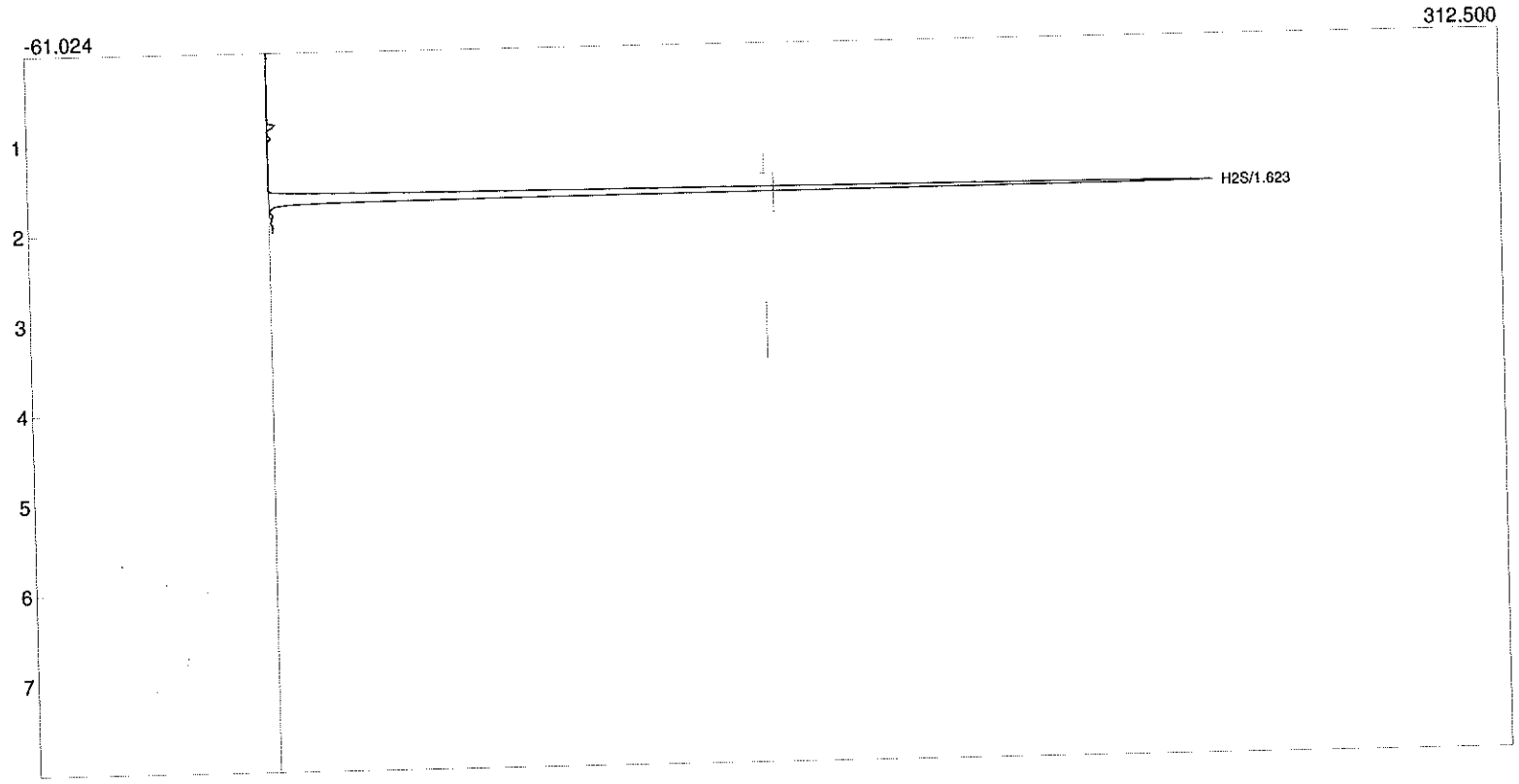

Component	Retention	External	Units
H2S	1.623	118.3200	
		118.3200	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
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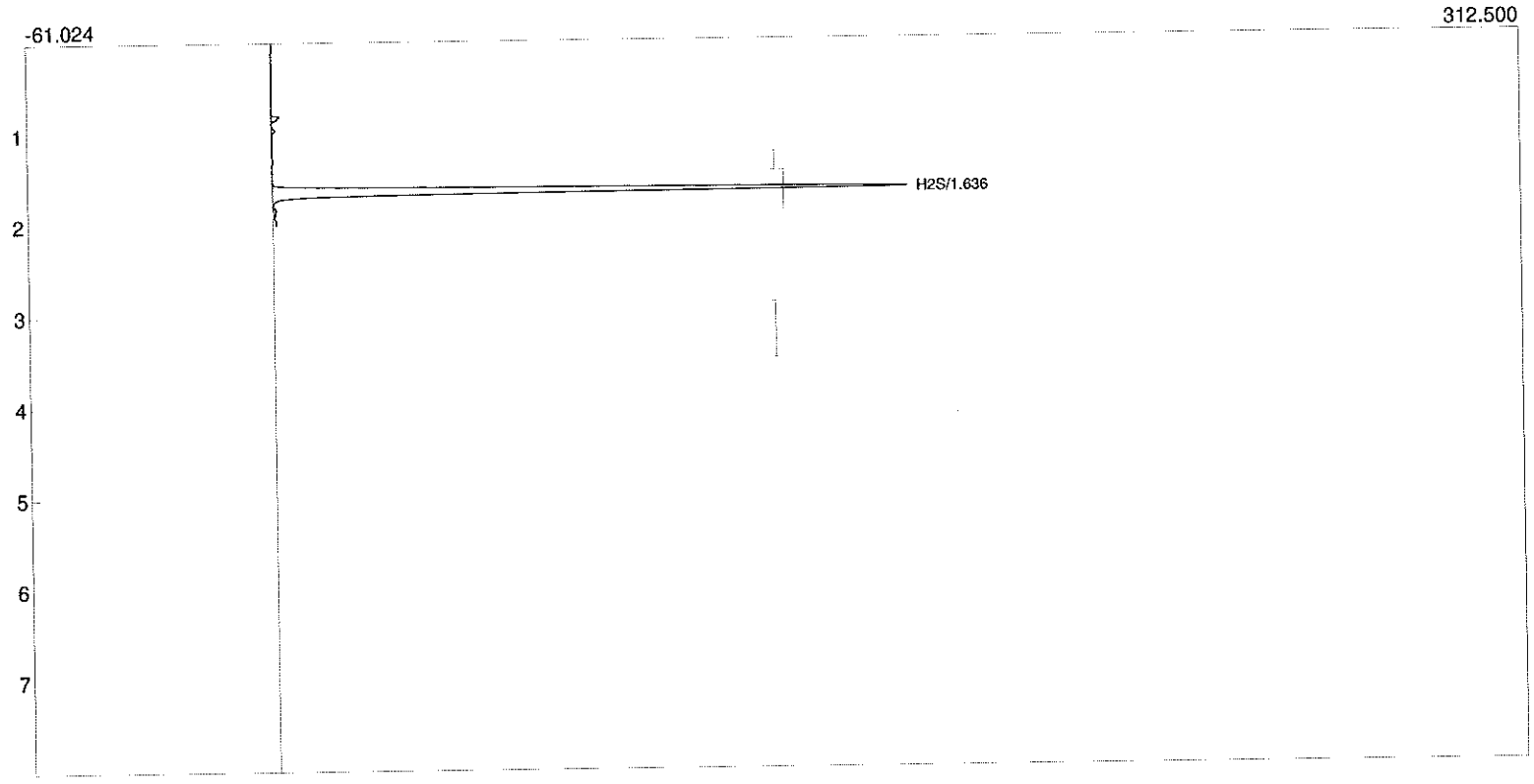

Component	Retention	External	Units
H2S	1.636	95.0013	
		95.0013	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
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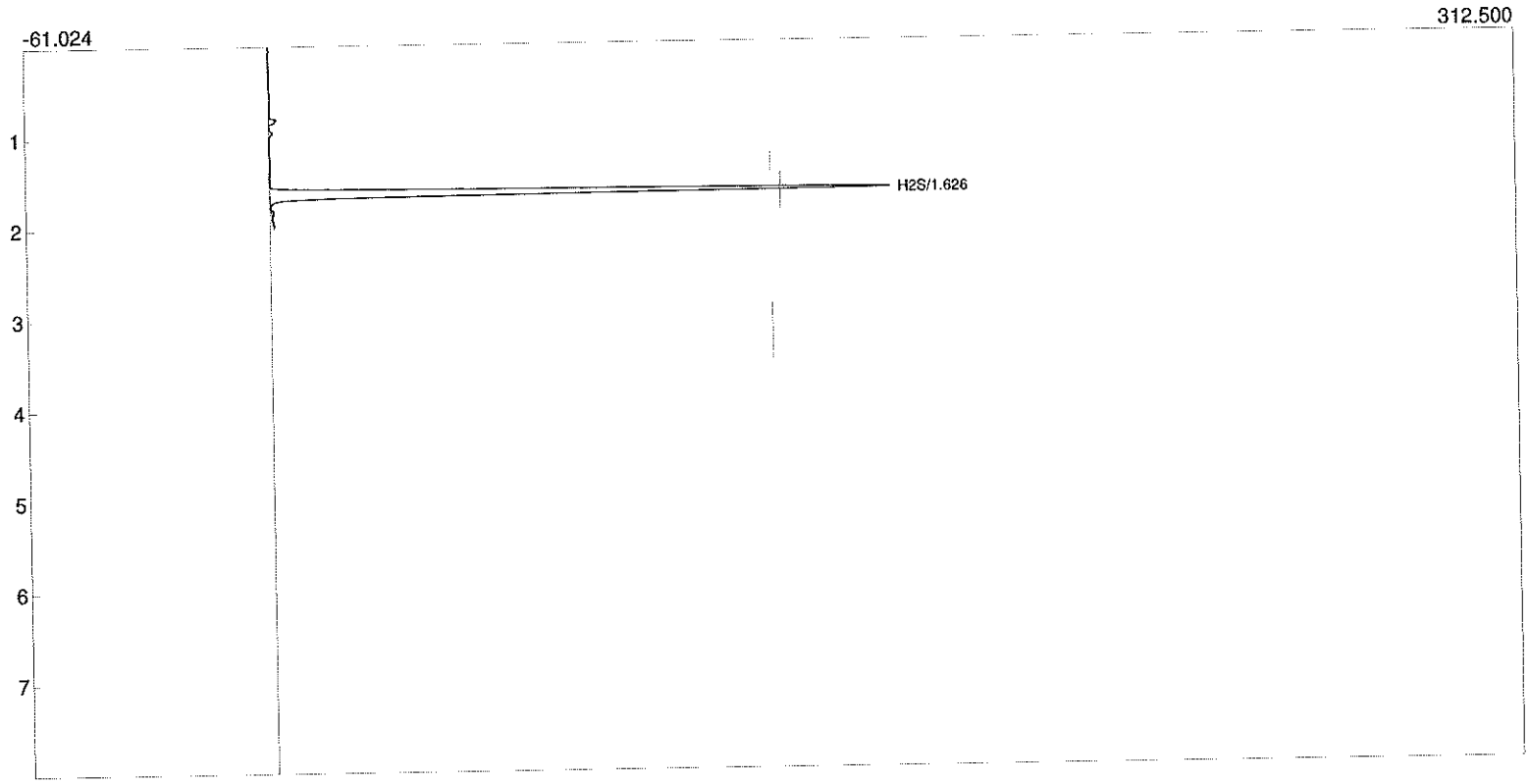

Component	Retention	External	Units
H2S	1.626	92.9681	
		92.9681	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
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Carrier: Nitrogen 21 PSI
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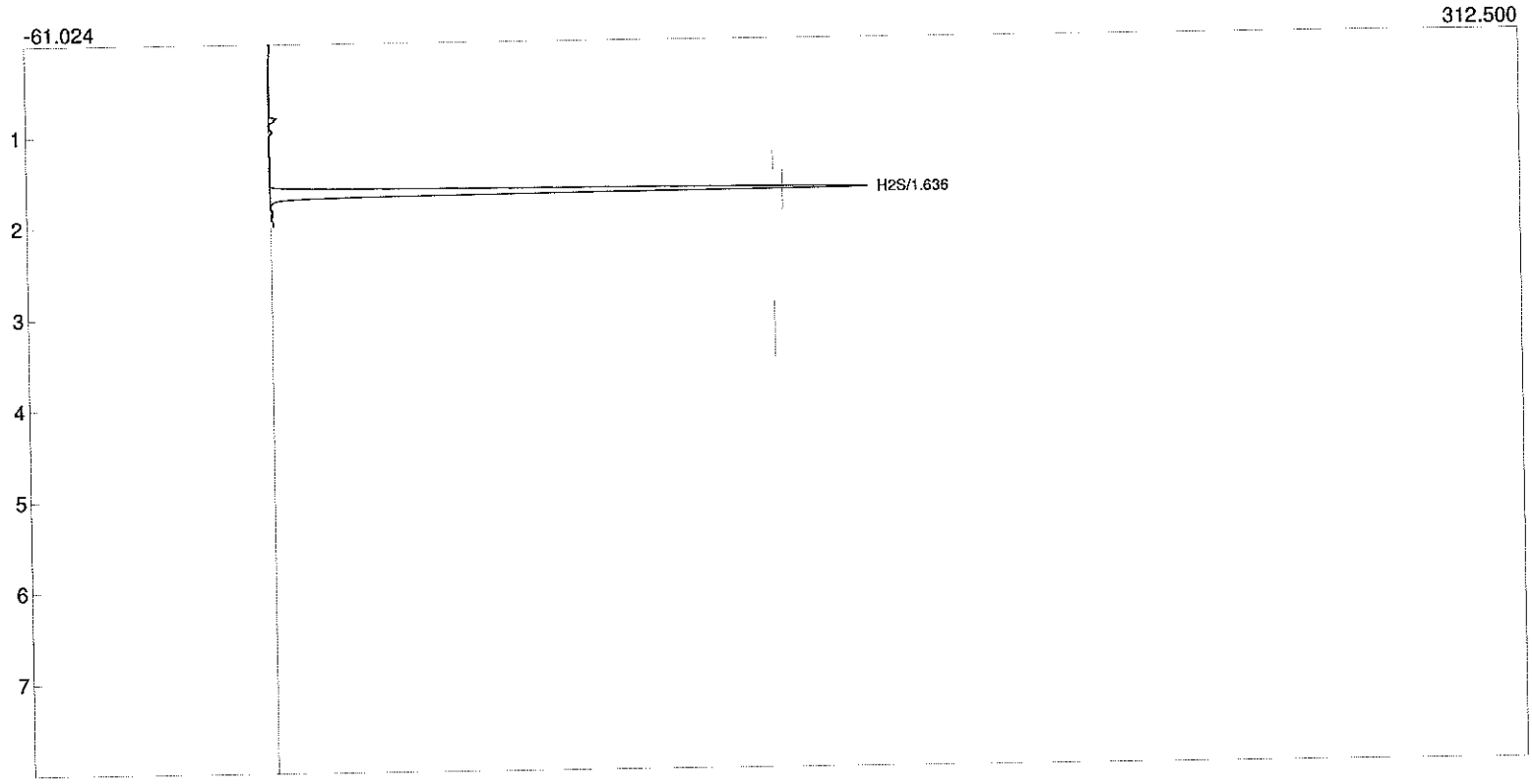

Component	Retention	External	Units
H2S	1.636	92.1047	
		92.1047	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
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Carrier: Nitrogen 21 PSI
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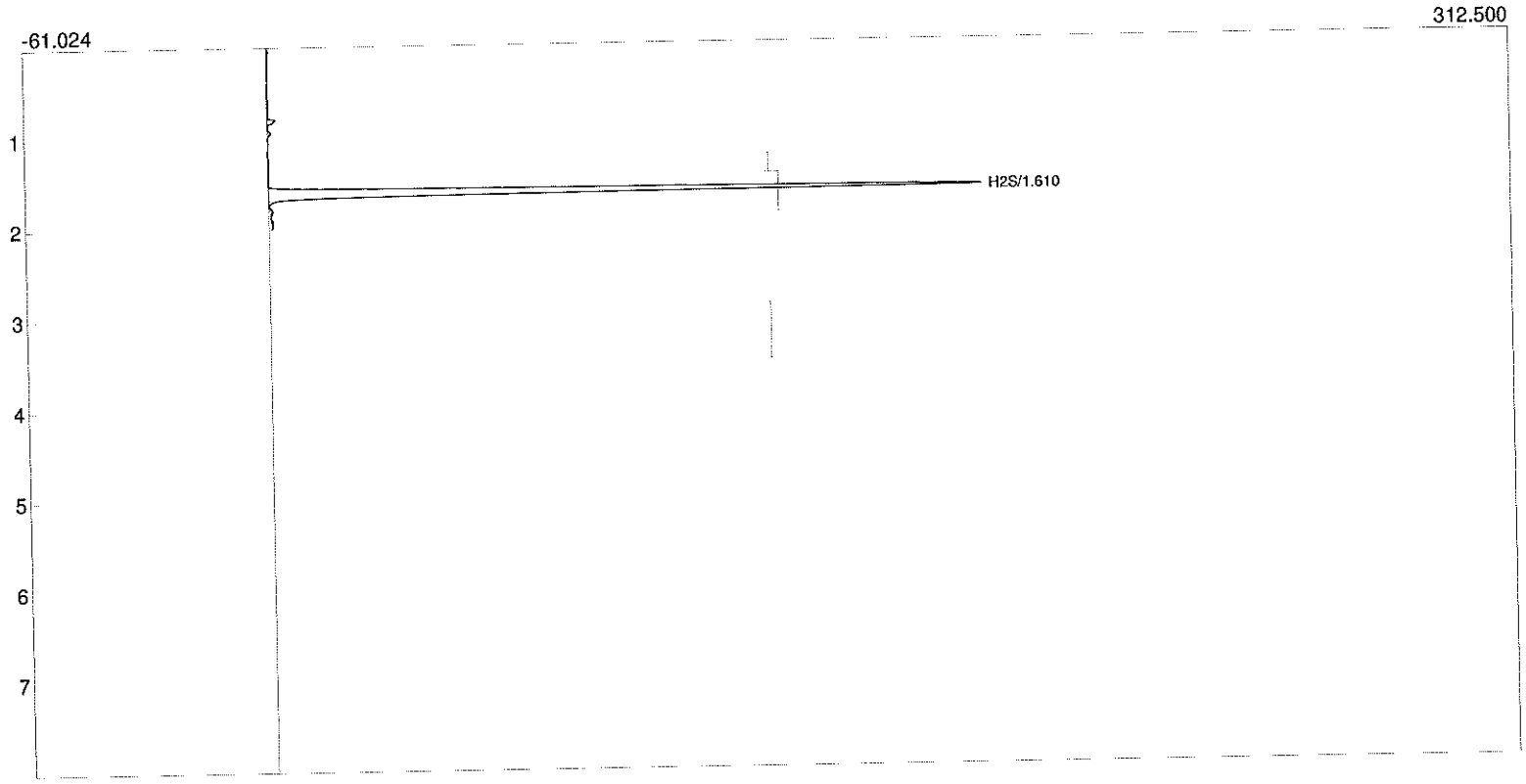

Component	Retention	External	Units
H2S	1.610	99.9591	
		99.9591	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
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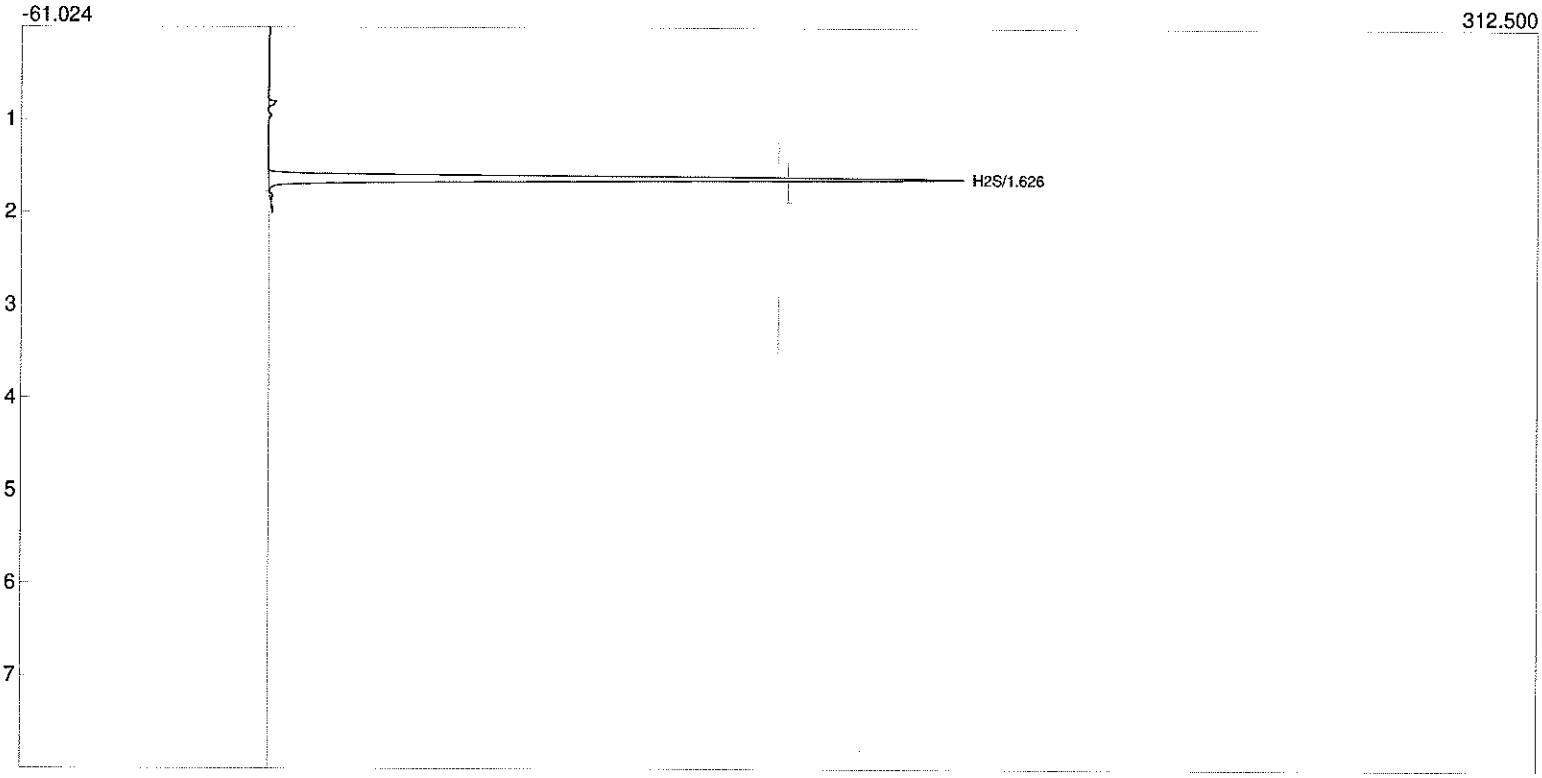

Component	Retention	External	Units
H2S	1.626	97.7930	
		97.7930	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
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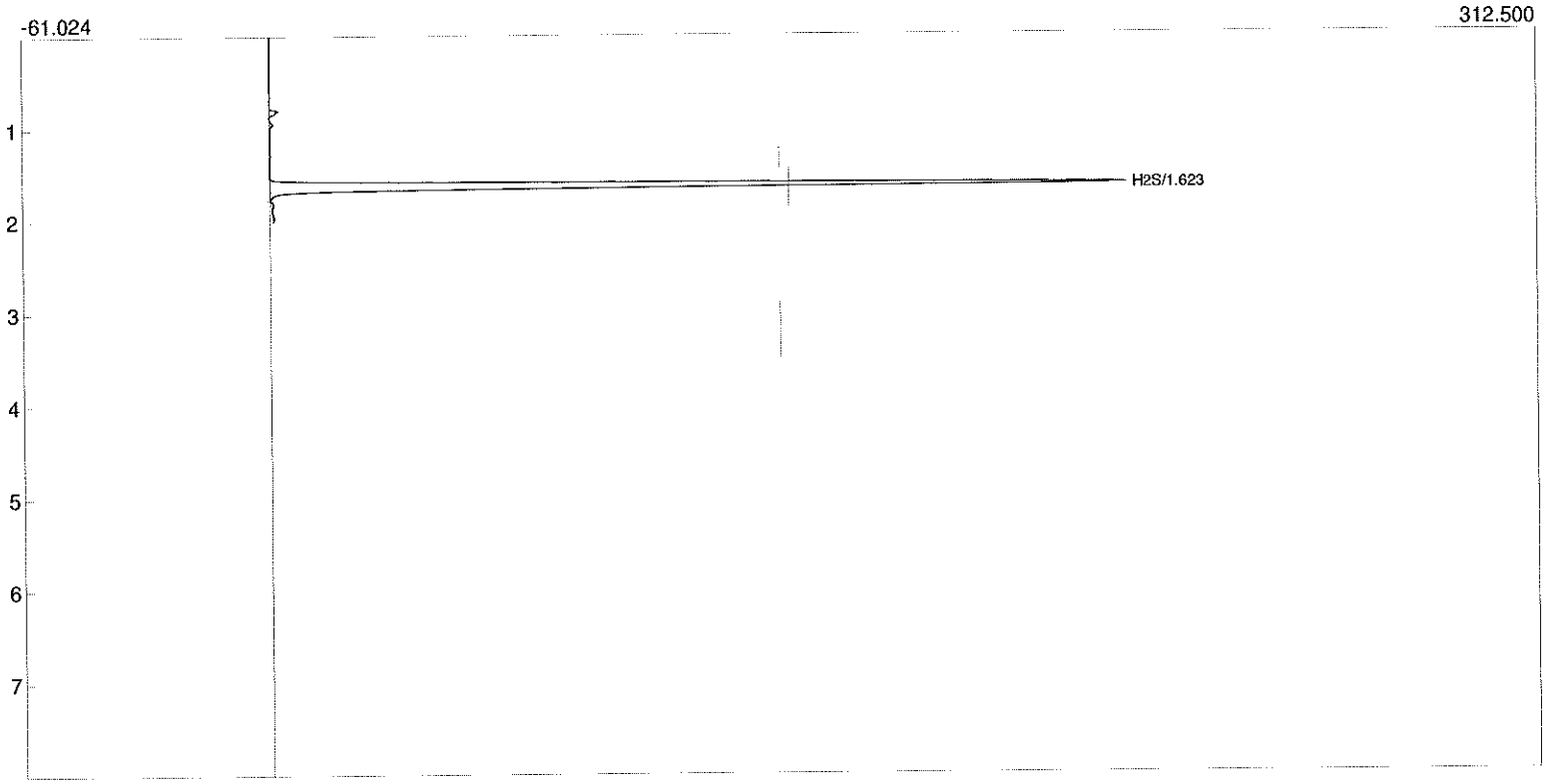

Component	Retention	External	Units
H2S	1.623	109.3831	
		109.3831	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
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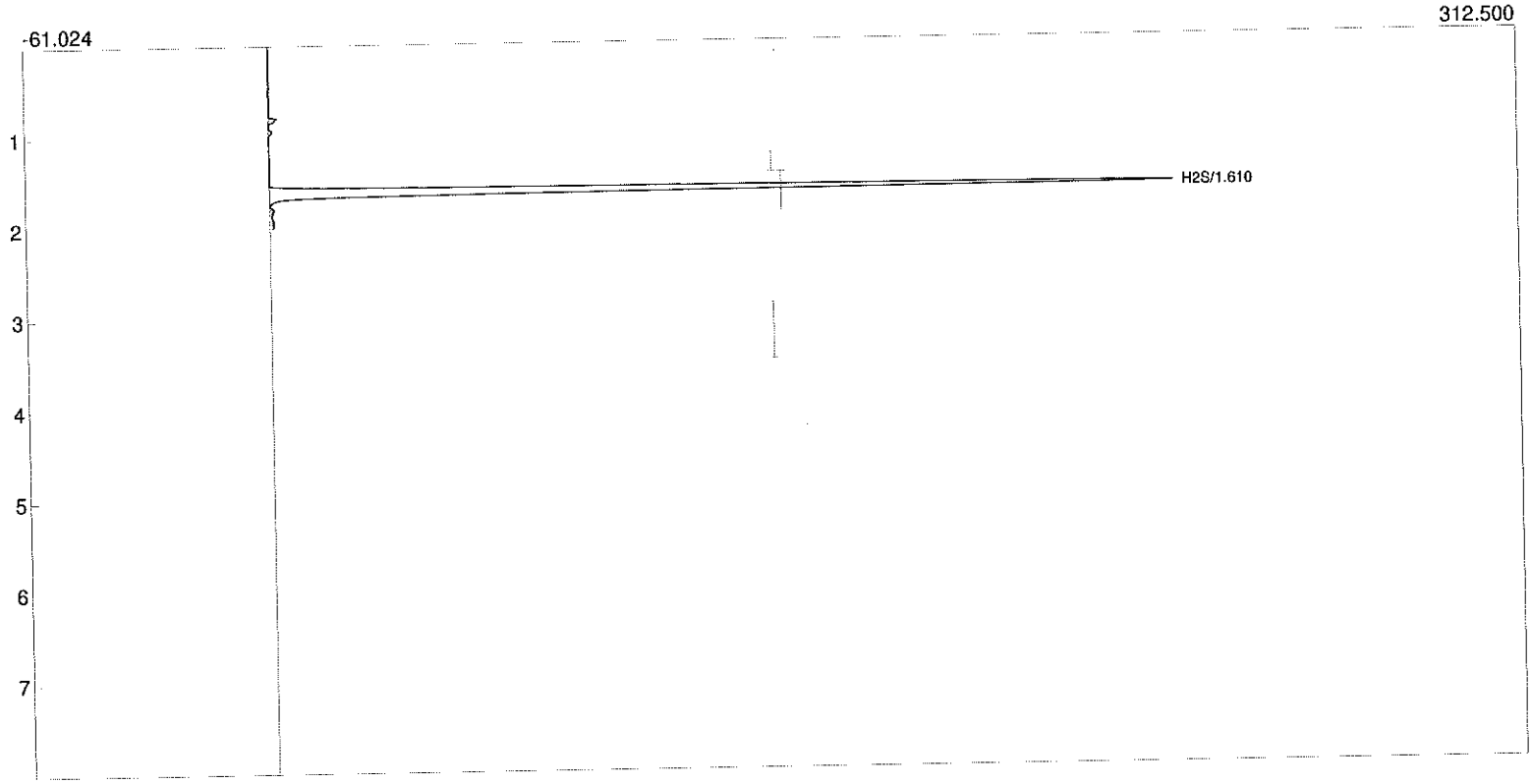
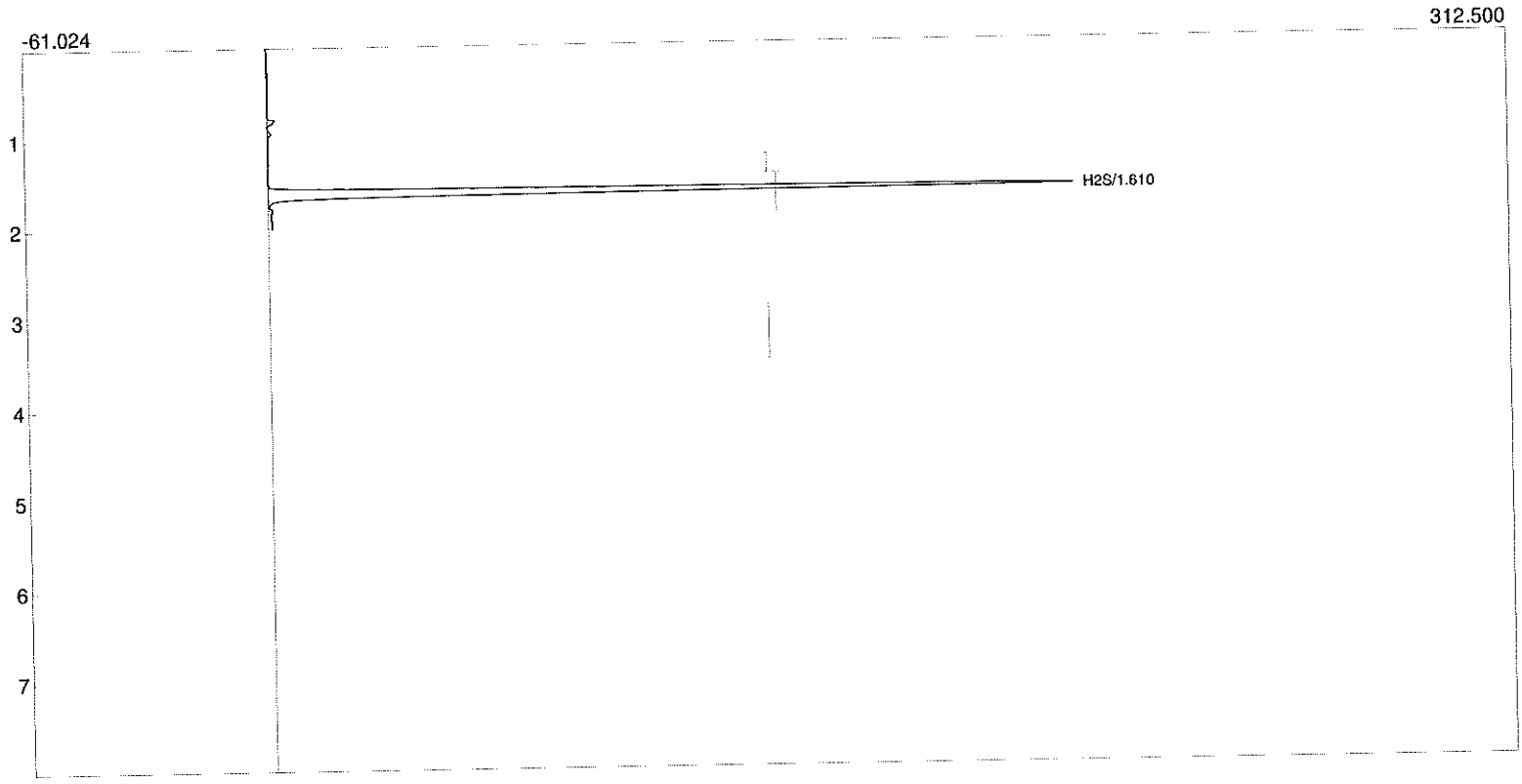


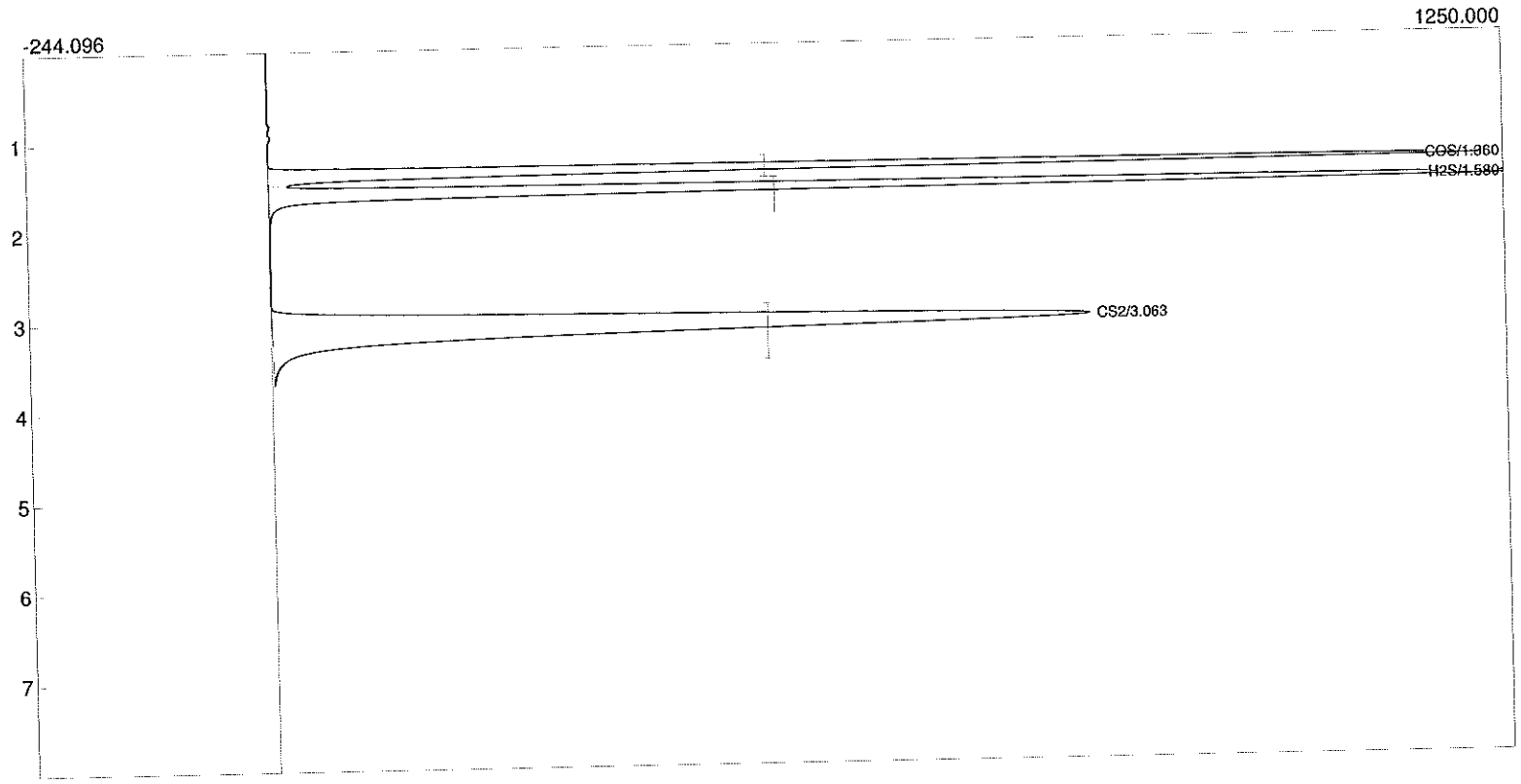
Component	Retention	External	Units
H2S	1.610	114.1483	
		114.1483	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
ontrol filename: C:\peak444-64bit\H2swynn.con
Data file: 5281_305_57.CHR ()



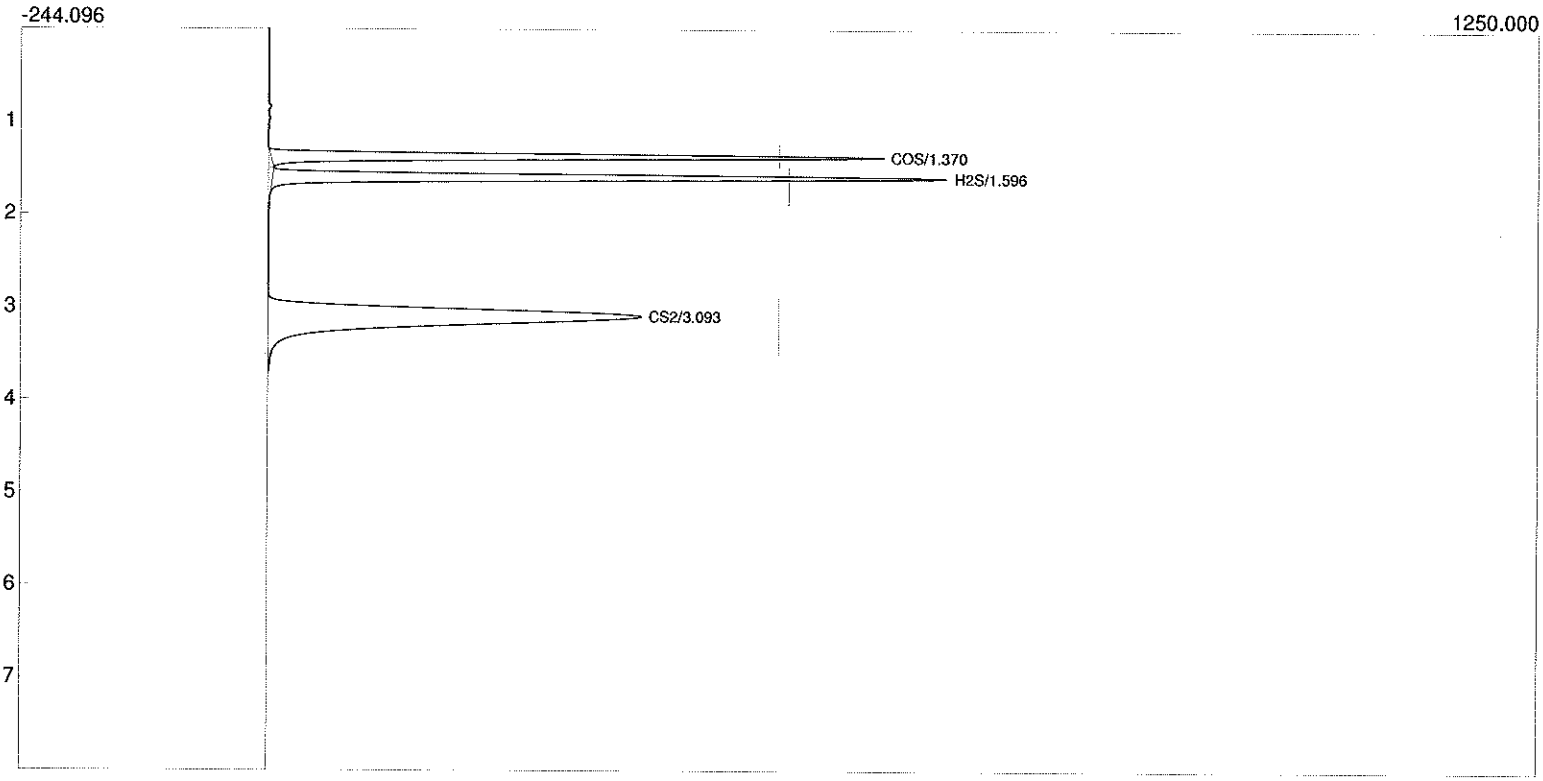
Component	Retention	External	Units
H2S	1.610	107.4304	
		107.4304	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_01.CHR ()
Sample: cal 488



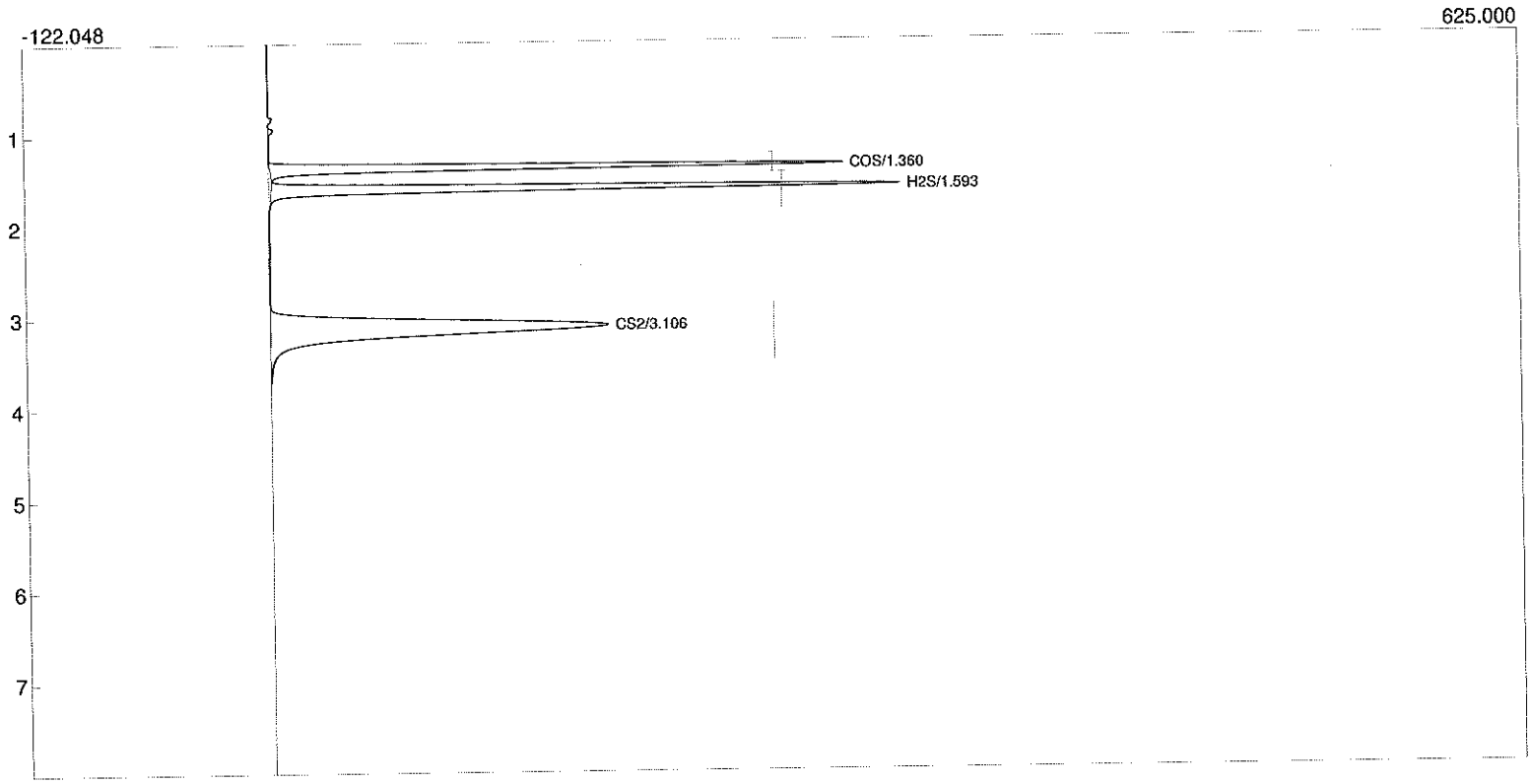
Component	Retention	External	Units
COS	1.360	481.1534	
H2S	1.580	488.1923	
CS2	3.063	509.4956	
		1478.8413	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_02.CHR ()
Sample: cal 244



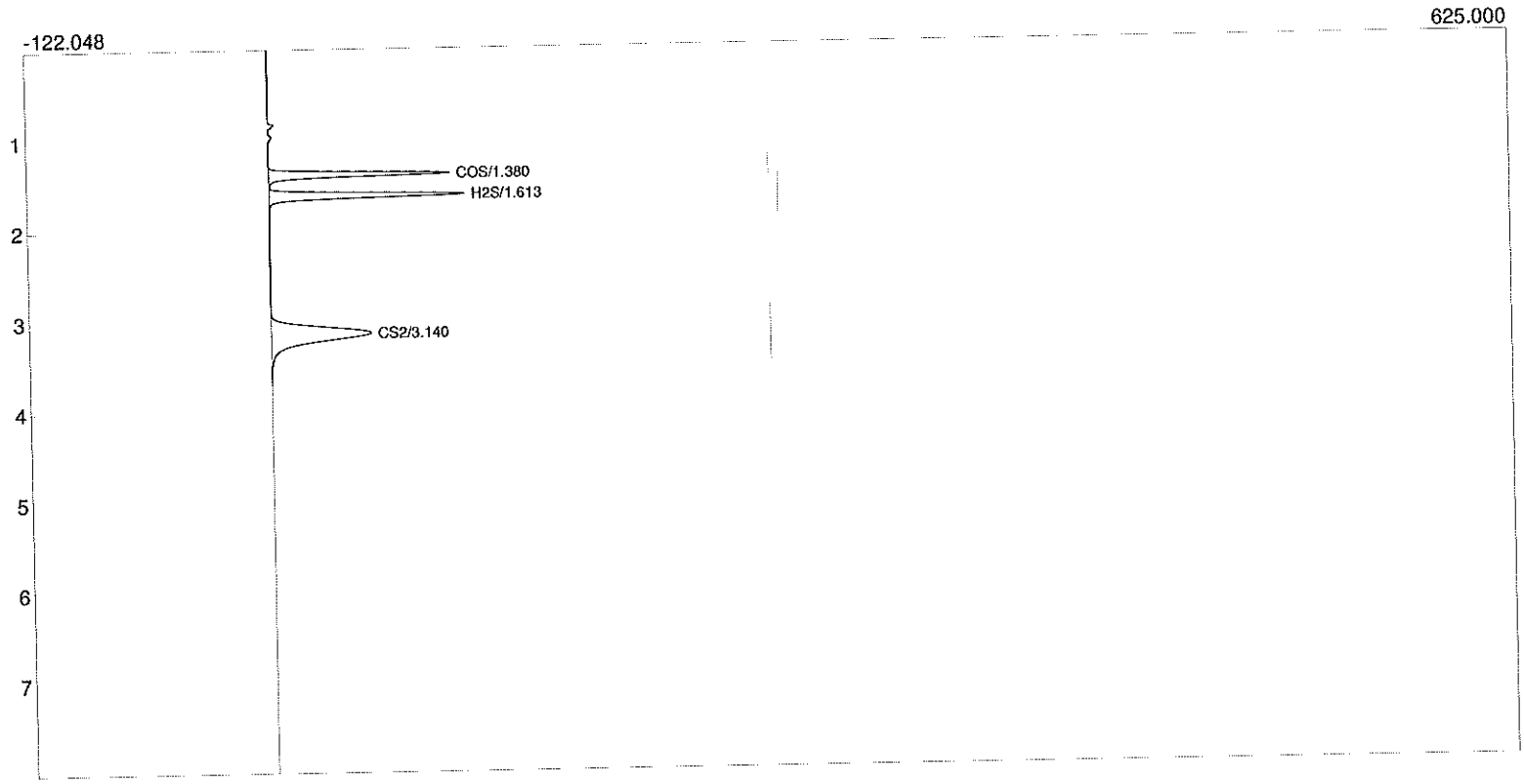
Component	Retention	External	Units
COS	1.370	240.6243	
H2S	1.596	244.0275	
CS2	3.093	254.7931	
		739.4450	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_03.CHR ()
Sample: cal 157



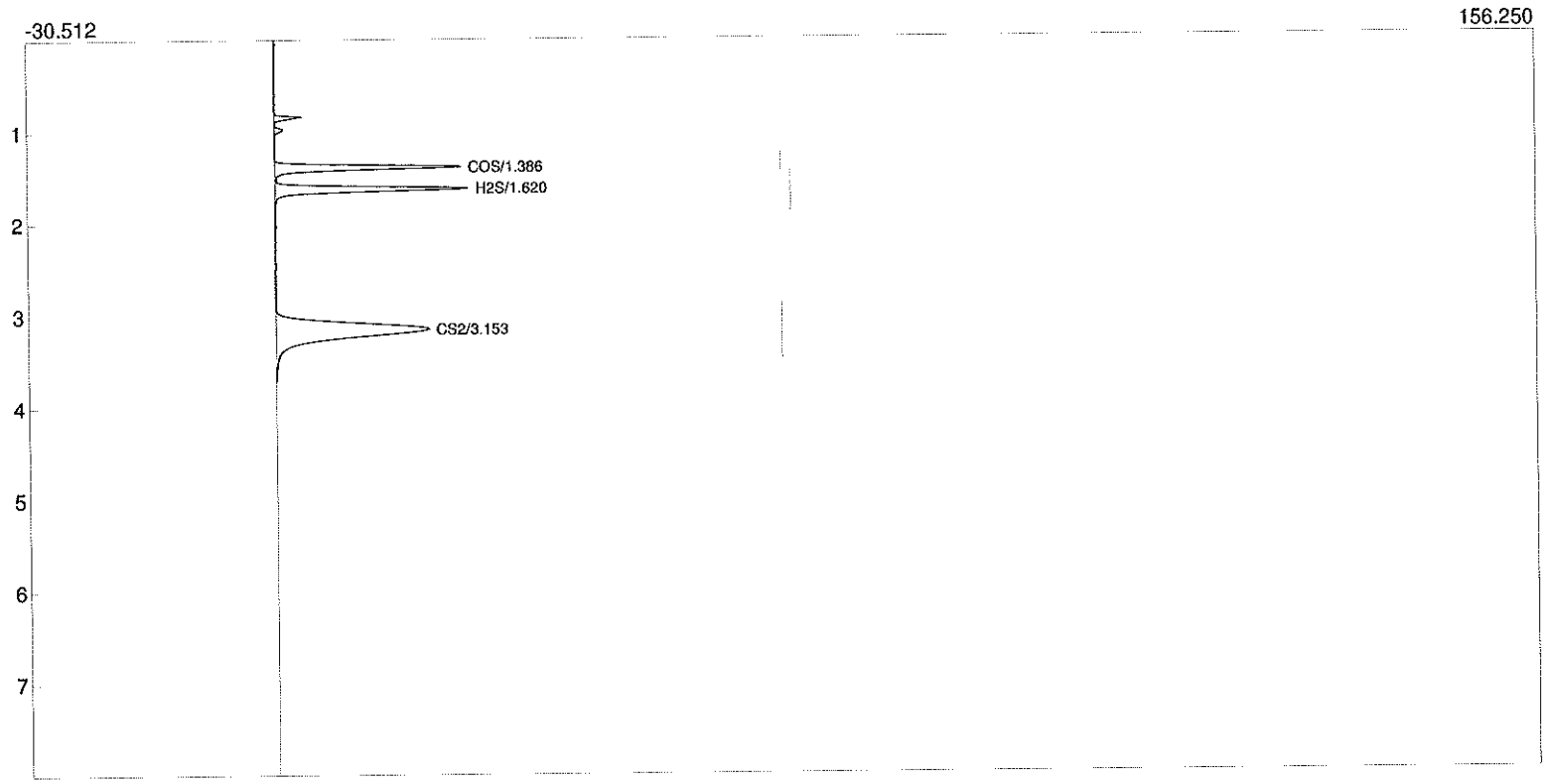
Component	Retention	External	Units
COS	1.360	157.4060	
H2S	1.593	154.6374	
CS2	3.106	161.3844	
		473.4277	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_04.CHR ()
Sample: cal 78



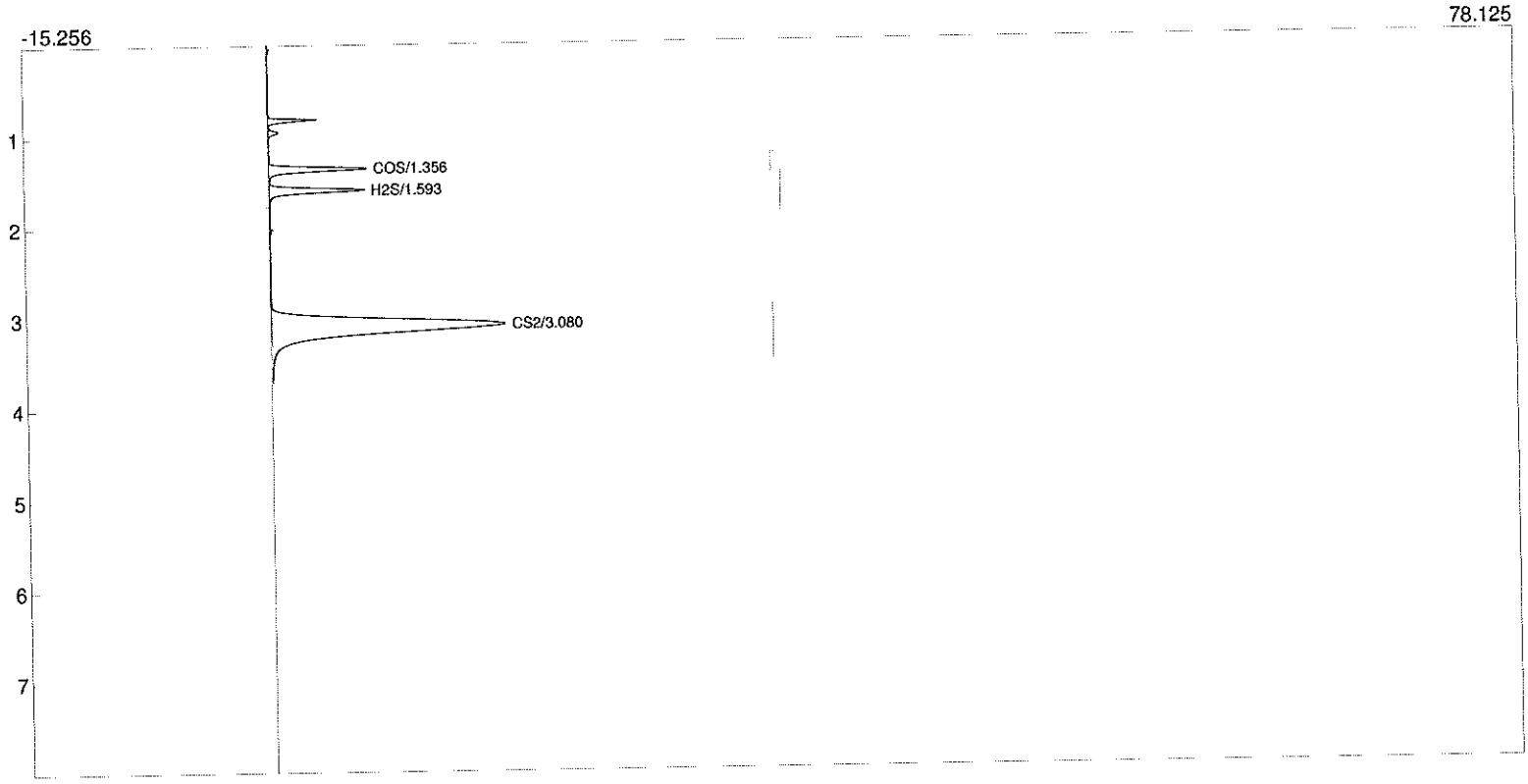
Component	Retention	External	Units
COS	1.380	78.7072	
H2S	1.613	77.3724	
CS2	3.140	80.7075	
		236.7871	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_05.CHR ()
Sample: cal 38



Component	Retention	External	Units
COS	1.386	39.3530	
H2S	1.620	38.6524	
CS2	3.153	40.4122	
		118.4176	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_06.CHR ()
Sample: cal 19



Component	Retention	External	Units
COS	1.356	19.6283	
H2S	1.593	19.3106	
CS2	3.080	20.1660	
		59.1050	

APPENDIX B - Hydrocracker Flare Yokogawa GC 8000 H_2S CEMS Data

DeNovo Global Technologies, Inc.
CVREnergy - Wynnewod Refinery
Hydrocracker Flare CEMS Data
Date is: 11/29/2016

Timestamp	Hydrocracker Flare H2S - ppm	
9:30:00	123.00	
9:31:00	116.02	
9:32:00	116.03	Run 1
9:33:00	116.03	
9:34:00	116.03	
9:35:00	121.84	
9:36:00	127.67	
9:37:00	127.68	
9:38:00	127.68	
9:39:00	127.69	
9:40:00	122.89	
9:41:00	118.09	
9:42:00	118.08	
9:43:00	118.07	
9:44:00	118.07	
9:45:00	114.88	
9:46:00	111.68	Run 2
9:47:00	111.67	
9:48:00	111.67	
9:49:00	111.67	
9:50:00	111.21	
9:51:00	110.75	
9:52:00	110.75	
9:53:00	110.75	
9:54:00	110.76	
9:55:00	112.93	Run 3
9:56:00	115.10	
9:57:00	115.10	
9:58:00	115.10	
9:59:00	115.11	
10:00:00	119.69	
10:01:00	124.26	
10:02:00	124.26	
10:03:00	124.26	
10:04:00	124.25	
10:05:00	117.97	
10:06:00	111.68	Run 4
10:07:00	111.68	
10:08:00	111.68	
10:09:00	111.67	
10:10:00	111.45	
10:11:00	111.22	
10:12:00	111.21	
10:13:00	111.20	
10:14:00	111.22	
10:15:00	113.50	Run 5
10:16:00	115.79	
10:17:00	115.78	
10:18:00	115.78	
10:19:00	115.78	
10:20:00	120.59	
10:21:00	125.41	
10:22:00	125.42	
10:23:00	125.41	
10:24:00	125.40	
10:25:00	119.00	

10:26:00	112.60	Run 6
10:27:00	112.60	
10:28:00	112.59	
10:29:00	112.60	
10:30:00	110.88	
10:31:00	109.15	
10:32:00	109.16	
10:33:00	109.16	
10:34:00	109.15	
10:35:00	116.59	
10:36:00	124.02	
10:37:00	124.03	
10:38:00	124.05	
10:39:00	124.04	
10:40:00	121.17	
10:41:00	118.29	
10:42:00	118.29	
10:43:00	118.31	
10:44:00	118.31	
10:45:00	116.02	
10:46:00	113.73	
10:47:00	113.72	
10:48:00	113.72	
10:49:00	113.73	
10:50:00	110.42	
10:51:00	107.09	Run 7
10:52:00	107.08	
10:53:00	107.09	
10:54:00	107.09	
10:55:00	108.01	
10:56:00	108.93	
10:57:00	108.94	
10:58:00	108.93	
10:59:00	108.94	
11:00:00	109.63	
11:01:00	110.31	
11:02:00	110.30	
11:03:00	110.30	
11:04:00	110.30	
11:05:00	113.39	
11:06:00	116.49	
11:07:00	116.49	
11:08:00	116.48	
11:09:00	116.49	Run 8
11:10:00	113.17	
11:11:00	109.84	
11:12:00	109.84	
11:13:00	109.85	
11:14:00	109.84	
11:15:00	108.69	
11:16:00	107.54	
11:17:00	107.55	
11:18:00	107.55	Run 9
11:19:00	107.56	
11:20:00	110.76	
11:21:00	113.96	
11:22:00	113.97	
11:23:00	113.96	
11:24:00	113.96	
11:25:00	119.22	
11:26:00	124.48	
11:27:00	124.48	

11:28:00	124.48	
11:29:00	124.49	
11:30:00	121.63	
11:31:00	118.77	
11:32:00	118.76	
11:33:00	118.76	
11:34:00	118.76	
11:35:00	115.91	
11:36:00	113.05	
11:37:00	113.04	
11:38:00	113.04	
11:39:00	113.04	
11:40:00	110.29	
11:41:00	107.55	
11:42:00	107.55	
11:43:00	107.54	
11:44:00	107.55	
11:45:00	106.63	
11:46:00	105.72	
11:47:00	105.72	Run 10
11:48:00	105.73	
11:49:00	105.73	
11:50:00	106.75	
11:51:00	107.78	
11:52:00	107.78	
11:53:00	107.78	
11:54:00	107.78	
11:55:00	106.17	
11:56:00	104.58	
11:57:00	104.59	
11:58:00	104.58	Run 11
11:59:00	104.57	
12:00:00	105.14	
12:01:00	105.72	
12:02:00	105.72	
12:03:00	105.72	
12:04:00	105.72	
12:05:00	104.92	
12:06:00	104.13	
12:07:00	104.12	
12:08:00	104.12	Run 12
12:09:00	104.11	
12:10:00	104.23	
12:11:00	104.35	
12:12:00	104.35	
12:13:00	104.35	
12:14:00	104.35	
12:15:00	104.46	
12:16:00	104.58	
12:17:00	104.57	
12:18:00	104.57	
12:19:00	104.58	
12:20:00	107.67	Run 13
12:21:00	110.75	
12:22:00	110.76	
12:23:00	110.77	
12:24:00	110.77	
12:25:00	114.54	
12:26:00	118.31	
12:27:00	118.30	
12:28:00	118.31	
12:29:00	118.32	

12:30:00	117.97	
12:31:00	117.63	
12:32:00	117.64	
12:33:00	117.63	
12:34:00	117.62	
12:35:00	118.65	
12:36:00	119.69	
12:37:00	119.69	
12:38:00	119.68	
12:39:00	119.69	
12:40:00	120.27	
12:41:00	120.84	
12:42:00	120.83	
12:43:00	120.82	
12:44:00	120.83	
12:45:00	119.68	
12:46:00	118.54	Run 14
12:47:00	118.55	
12:48:00	118.55	
12:49:00	118.54	
12:50:00	121.17	
12:51:00	123.80	
12:52:00	123.80	
12:53:00	123.80	
12:54:00	123.80	
12:55:00	122.66	
12:56:00	121.51	
12:57:00	121.51	
12:58:00	121.51	
12:59:00	121.52	
13:00:00	121.75	
13:01:00	121.97	
13:02:00	121.96	
13:03:00	121.96	
13:04:00	121.96	
13:05:00	122.76	
13:06:00	123.56	
13:07:00	123.56	
13:08:00	123.58	
13:09:00	123.57	
13:10:00	122.31	
13:11:00	121.05	
13:12:00	121.05	
13:13:00	121.05	
13:14:00	121.05	
13:15:00	112.02	Run 15
13:16:00	102.98	
13:17:00	102.99	
13:18:00	102.98	
13:19:00	102.98	
13:20:00	102.75	
13:21:00	102.52	
13:22:00	102.52	
13:23:00	102.52	Run 16
13:24:00	102.52	
13:25:00	102.86	

APPENDIX C - Gas Calibration Certificates / Support Documentation

Airgas
an Air Liquide company

Airgas USA, LLC
616 Miller Cut Off Rd.
LaPorte, TX 77571
281-842-6900
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: PRIMARY STANDARD

Customer: DENOVO GLOBAL TECHNOLOGIES INC - LA PORTE , TX
Part Number: X05ME78P33A0000
Cylinder Number: FF48905
Laboratory: 124 - LaPorte Mix (SAP) - TX
Analysis Date: Oct 19, 2016
Lot Number: 126-400785023-1

Reference Number: 126-400785023-1
Cylinder Volume: 31.7 CF

Cylinder Pressure: 1606 PSIG
Valve Outlet: 330

Expiration Date: Oct 19, 2017

Primary Standard Gas Mixtures are traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration (Mole %)	Analytical Uncertainty
CARBON DISULFIDE	150.0 PPM	161.4 PPM	+/- 1%
CARBONYL SULFIDE	150.0 PPM	157.4 PPM	+/- 1%
HYDROGEN SULFIDE	150.0 PPM	154.7 PPM	+/- 1%
ETHANE	21.00 %	21.01 %	+/- 1%
METHANE	Balance		

Notes:
RECERTIFICATION
DENOVO GLOBAL TECHNOLOGIES INC
PO#: RECERT 9/29/2016

Approved for Release

Airgas

Airgas USA, LLC
616 Miller Cut Off Road
Laporte, TX 77571
281-842-6900
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: CERTIFIED STANDARD-SPEC

Customer: DENOVO GLOBAL TECHNOLOGIES INC - LAPORTE, TX
Part Number: X05ME78C33A0040
Cylinder Number: FF37344
Laboratory: ASG - LaPorte Mix (SAP) - TX
Analysis Date: Jul 05, 2016
Lot Number: 126-400732979-1

Reference Number: 126-400732979-1
Cylinder Volume: 42 CF
Cylinder Pressure: 2015 PSIG
Valve Outlet: 330

Expiration Date: Jul 05, 2017

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration (Mole %)	Analytical Uncertainty
CARBON DISULFIDE	500.0 PPM	509.6 PPM	+/- 2%
CARBONYL SULFIDE	500.0 PPM	481.2 PPM	+/- 2%
HYDROGEN SULFIDE	500.0 PPM	488.2 PPM	+/- 2%
ETHANE	21.00 %	21.02 %	+/- 2%
METHANE	Balance		

Notes:.
PO# DGT-7305

Approved for Release

APPENDIX D - Example Calculations

where:

RA	=	Relative accuracy of the CEMS system to the RM
D	=	Absolute value of the mean of the differences
CC	=	Absolute value of the confidence coefficient
RM	=	Average RM value or the applicable emission standard

Emission Rate Calculation lbs/MMBtu:

FUNC { E~=~C_corrected`~MW over {385.33*10^6}~`F_d`{{20.9} over {(20.9`-`%O_{2d})}}}

Where:

E = Pollutant emission rate, ng/J (lbs/million Btu).

$C_{corrected}$ = Average calibration corrected concentration, ppm or percent

MW = Molecular weight of compound, lbs/lb-mol

F_d = Volume of combustion components per unit of heat content, scm/J (scf/million Btu).

$\%O_{2d}$ = Concentration of oxygen on a dry basis, percent.

APPENDIX E - Quality Assurance / Quality Control

QUALITY ASSURANCE / QUALITY CONTROL

Specific quality control measures were used to insure the generation of reliable data from all sampling and analysis activities. Proper collection and organization of information followed by clear and concise reporting of the data was a primary goal in the project.

The objective of a quality assurance/quality control (QA/QC) program is to ensure that the precision and accuracy of all environmental data generated by DeNovo Global Technologies, Inc. is commensurate with data quality objectives (DQOs). DQOs are based on a common understanding of the intended end use(s) of the data, the measurement process, and the availability of resources. Once DQOs are established, formally or informally, QC protocol can be defined for the measurements.

In this project, the final data users will be Wynnewood Refining Company, USEPA Region VI, and the State of Oklahoma. The DQOs for this project are to generate legally defensible data to be used to demonstrate 40 CFR Part 60 and Part 63 compliance.

Two basic goals of a QC program are to:

1) Control errors; and
2) Verify that the entire analytical method is operating within acceptable performance limits.

Use of qualified personnel, reliable and well-maintained equipment, appropriate calibrations and standards, and close supervision of all operations are important components of the QC program. The following sections describe the QC results for maintaining instruments and equipment in a state of calibration (defines the accuracy or bias error), results for measuring a continuously maintained state of cleanliness (eliminates interference or contamination), and the paper trail which documents that the methods were performed to instructions, calibrated within method performance standards, and/or traceable to National Technical Information Services (NTIS) standard reference materials. Standards of QA set forth in the Quality Assurance Handbook for Air Pollution Measurements Systems, Volume III (USEPA-600/4-77-027b) were strictly followed.

FIELD DATA REDUCTION

Example calculations are used in the field to check on sampling conditions and a list of formulas used to reduce the field data. The data collected was reviewed in the field by the Project Manager. Errors or discrepancies were noted on the data sheet. Appendices of this report present the standardized forms that were used to record field sampling data.

INTERNAL QC CHECKS AND FREQUENCY

QC checks were performed to ensure the collection of representative samples and the generation of valid analytical results of these samples. These checks were performed by project participants throughout the program.

QA PROCEDURES

The following QA procedures were implemented during this test program:

- Use of designated sampling and analytical equipment. The sampling equipment used in this test met all calibration and operating criteria of the applicable ODEQ and USEPA Methods.

- Sampling system was calibrated and operated according to ODEQ and USEPA documented procedures. All site activities including audit results were logged into the daily site book.

- Equipment calibration - The mobile sampling equipment is calibrated with two concentrations of USEPA Protocol 1 gasses and a zero gas before the first test. Calibration span setting are check after each run. Other test equipment is calibrated in accordance with USEPA specifications in Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III (USEPA-600/4-77-027b).

DENOVO

December 12, 2016

Mr. David M. Heller
Environmental Engineer III
Wynnewood Refining Company
906 South Powell Street
Wynnewood, Oklahoma 73098

Re: Plant Fuel Gas – Yokogawa GC8000 H_2s Gas Chromatograph Annual RATA Performance Test, CVR Energy, Wynnewood Refining Company, Wynnewood, Oklahoma

Dear Mr. Heller:

Enclosed are 3 hard copies and 1 copy on CD of the final test report for the Plant Fuel Gas – Yokogawa GC8000 H_2s Gas Chromatograph at the CVR Energy. – Wynnewood Refinery facility located in Wynnewood, Oklahoma.

If you have any questions or comments, please do not hesitate to call me at (281) 251-0399. DeNovo appreciates this opportunity and we look forward to continuing our successful and lasting relationship.

Sincerely,

Louis M. Esposito

Louis M. Esposito
Director
LME/th

17902 East Strack Drive, Spring, TX 77379
281.251.0399, http://www.denovogt.com

WYNNEWOOD REFINING™

A CVR Refining, LP Company

PLANT FUEL GAS – YOKOGAWA GC8000 H_2S GAS CHROMATOGRAPH
2016 ANNUAL RATA PERFORMANCE TEST

CVR ENERGY – WYNNEWOOD REFINERY

WYNNEWOOD, OKLAHOMA

Final Report
December 12, 2016

Project # 5281.03.05

17902 East Strack Drive, Spring, TX 77379
281.251.0399, http://www.denovogt.com

SUMMARY

DeNovo Global Technologies, Inc. (DeNovo) conducted the annual Relative Accuracy Test Audit (RATA) on the Plant Fuel Gas continuous emissions monitoring systems (CEMS) associated with the CVR Energy. – Wynnewood Refining Company (WRC) petroleum refinery located in Wynnewood, Oklahoma plant operation. Annual certification testing was conducted on the Plant Fuel Gas Yokogawa GC8000 H_2S Gas Chromatograph for the pollutant Hydrogen Sulfide (H_2S). This test was performed to provide documentation of compliance with quality assurance provisions governed under Federal regulations associated with 40 CFR Part 60, 40 CFR Part 63 along with the facility state operating permit.

The testing was conducted on November 29, 2016. The test procedures were performed in accordance with 40 CFR, Part 60, Appendix B, utilizing a modified EPA Reference Methods 15 for the determination of H_2S. This report presents the results of that testing.

Mr. David M. Heller of Wynnewood Refining Company (WRC) was the project coordinator. The team leader for DeNovo was Mr. Louis Esposito. The field sampling crew for DeNovo included Mr. Frank Roberto.

BASED ON THE TEST RESULTS, THE PLANT FUEL GAS YOKOGAWA GC8000 H_2S GAS CHROMATOGRAPH PASSED THE 2016 ANNUAL RATA PERFORMANCE CERTIFICATION.

Louis M. Esposito
Director
DeNovo Global Technologies, Inc

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APPENDIX D - Example Calculations .....
APPENDIX E - Quality Assurance / Quality Control .....

1.0 INTRODUCTION

DeNovo Global Technologies, Inc. (DeNovo) conducted the Annual RATA Performance Test (RATA) for the Yokogawa GC8000 H_2S Gas Chromatograph serving the Plant Fuel Gas associated with the WRC operations in Wynnewood, Oklahoma.

The H_2S Annual Performance RATA series consisted of sixteen samples taken within >3 <6 hours for the test series.

The subsequent sections of this report present results for the tests as follows:

2.0 — Test Methods and Equipment Summary
3.0 — Summary of Test Procedures and Results

The appendices provide documentation and supporting data. The appendices are organized as follows:

Appendix A — Emission Performance RM Calibration and Run Test Data
Appendix B — Operational Data
Appendix C — Gas Calibration Certificates/Support Documentation
Appendix D — Example Calculations
Appendix E — Quality Assurance

2.0 TEST METHODS AND EQUIPMENT SUMMARY

The test program was designed to provide data for documentation of compliance with federal regulations associated with NSPS Subparts and state operating permit requirements related to certification of unit emissions. Specifically, testing for the WRC facility consisted of sampling the Yokogawa GC8000 H_2S Gas Chromatograph for H_2S. The following is a brief description of the units:

Fuel Gas H_2S CEMS

H_2S Analyzer – Yokogawa Gas Chromatograph
Model: GC8000
Serial No.: KGC-11726
Plant I.D No.: 1000165
Span Range: 0 – 300 ppm H_2S

The Plant Data Acquisition System (DAS) is managed by a Honeywell Total Distributive Control (TDC) processor which compiles process data points from the units into the Honeywell Plant History Database (PHD). The PHD system provides one-minute averaged data.

3.0 SUMMARY OF TEST PROCEDURES AND RESULTS

A summary of the RATA test series is given in Table 3-1.

3.1 Emission Performance Test

RATA testing was performed on November 29, 2016 on the Yokogawa GC8000 H_2S Gas Chromatograph. A minimum of sixteen (16) test runs were used from sample bag injections. Testing was performed in accordance with EPA Method15 (modified), gas chromatography sampling and analytical test procedures to calculate the average for the RA determination for the unit. The RM average was then compared with the CEM averages to determine the analyzer relative accuracy. The RA Performance Specification for H_2S analyzer specifies the CEMS to be within 20% of the reference method, or 10% of the emission standard (162 ppm).

Based on the test results, the Yokogawa GC8000 H_2S Gas Chromatograph Passed the Annual RATA certification.

3.2 Sampling and Analytical Procedures

3.2.1 RM - Gas Chromatography Instrumentation

The compound to be analyzed for was hydrogen sulfide (H_2S). The instrument used for the analyses was a SRI 8610C equipped with a flame photometric detector (FPD). The detector temperature was set at 125^{0}C, and a sample flow of 70 ml per minute. Column temperature was set at 45^{0}C. A 1.0 - milliliter sample loop mounted on an automatic sampling valve was used to inject both calibration and sample gases on to two Chromasil 310 3-meter x 1/8" packed Teflon columns configured in series.

Sample size was set to 1.0 ml.

3.2.2 GC Calibration Procedure

The GC was calibrated using $H_2S/COS/CS_2$ certified gas. A 7-point curve was obtained by diluting the standard with nitrogen gas to 100% and 50% of a 488.2 ppm gas standard and also diluting the standard with nitrogen gas to 100%, 50%, 25%, 12.5% and 0% of the 154.7 ppm gas standard concentration. The dilutions were accomplished within the precision syringe by taking in a specified amount of standard and then diluting with the nitrogen. Runs were done at each calibration point until three consecutive runs were within 10% of each other with the final analysis point being added to the curve. Certified H_2S standards within the range of the facility operating conditions were injected to confirm calibration.

3.2.3 GC Sampling Procedure

The refinery fuel gas samples measured by the Yokogawa GC8000 H_2S Gas Chromatograph were sampled and measured according to the requirements and procedures of EPA Reference Method 15 with the following two modifications. Gas samples were collected in tedlar bags instead of direct injection and the GC was calibrated by means of certified gas standards versus permeation tubes. Each tedlar bag was purged with nitrogen prior to use and then filled directly from the Yokogawa fuel gas analyzer sample port feed tap. The sample port taps were fitted with 1/4" stainless swag-lok fittings and connected to Teflon tubing. The sample line was purged prior to each sample. The labeled tedlar bags were then immediately brought to the RM GC for immediate analysis via direct injection. No dilutions of the sample were necessary since the established calibration table covered the appropriate range.

3.2.4 GC Data Collection and Integration

The results were integrated using Peak Simple GC software, with data analysis specific to H_2S concentrations reported in parts per million (ppm)

Table 3-1: Summary Yokogawa GC8000 H_2S CEMS Rata

Run No.	RM H_2S (ppm)	CEMS H_2S (ppm)
1.	0.0	3.89
2.	0.0	3.88
3.	0.0	3.42
4.	0.0	2.27
5.	0.0	4.32
6.	0.0	3.62
7.	0.0	2.7
8.	0.0	3.61
9.	0.0	3.37
10.	0.0	4.06
11.	0.0	2.21
12.	0.0	3.34
13.	0.0	4.72
14.	0.0	5.64
15.	0.0	4.72
16.	0.0	4.94
Avg	0.0	3.79
Mean Difference	3.79	
StdDe	0.9458	
ConC.	0.5039	
RA%	>100	
Ac/Std %	2.7	
Status	PASS	

H_2S shall not exceed 20.0 percent of the mean value of the reference method test data or 10 percent of the Relative Standard, whichever is greater

APPENDIX A – Yokogawa GC8000 H_2S RM Calibration and Run Test Data

DeNovo Global Technologies, Inc. *ENVIRONMENTAL ENGINEERING AND TESTING SERVICES*

17902 East Strack Drive
Spring, Tx 77379

Phone: 281-251-0399
Fax: 281-251-1301

CLIENT:	CVR Energy	DATE:	11/29/2016
LOCATION:	Wynnewood, Oklahoma	PROJECT NO.:	5281.03.05
LOAD:	N/A	PERSONNEL:	Louis Esposito
ANALYZER:	Yokogawa GC8000	SOURCE:	Fuel Drum
I.D.:	KGC-11726	APPLICABLE STANDARD:	162

RELATIVE ACCURACY TESTING SUMMARY - Fuel Drum H2S ANALYZER

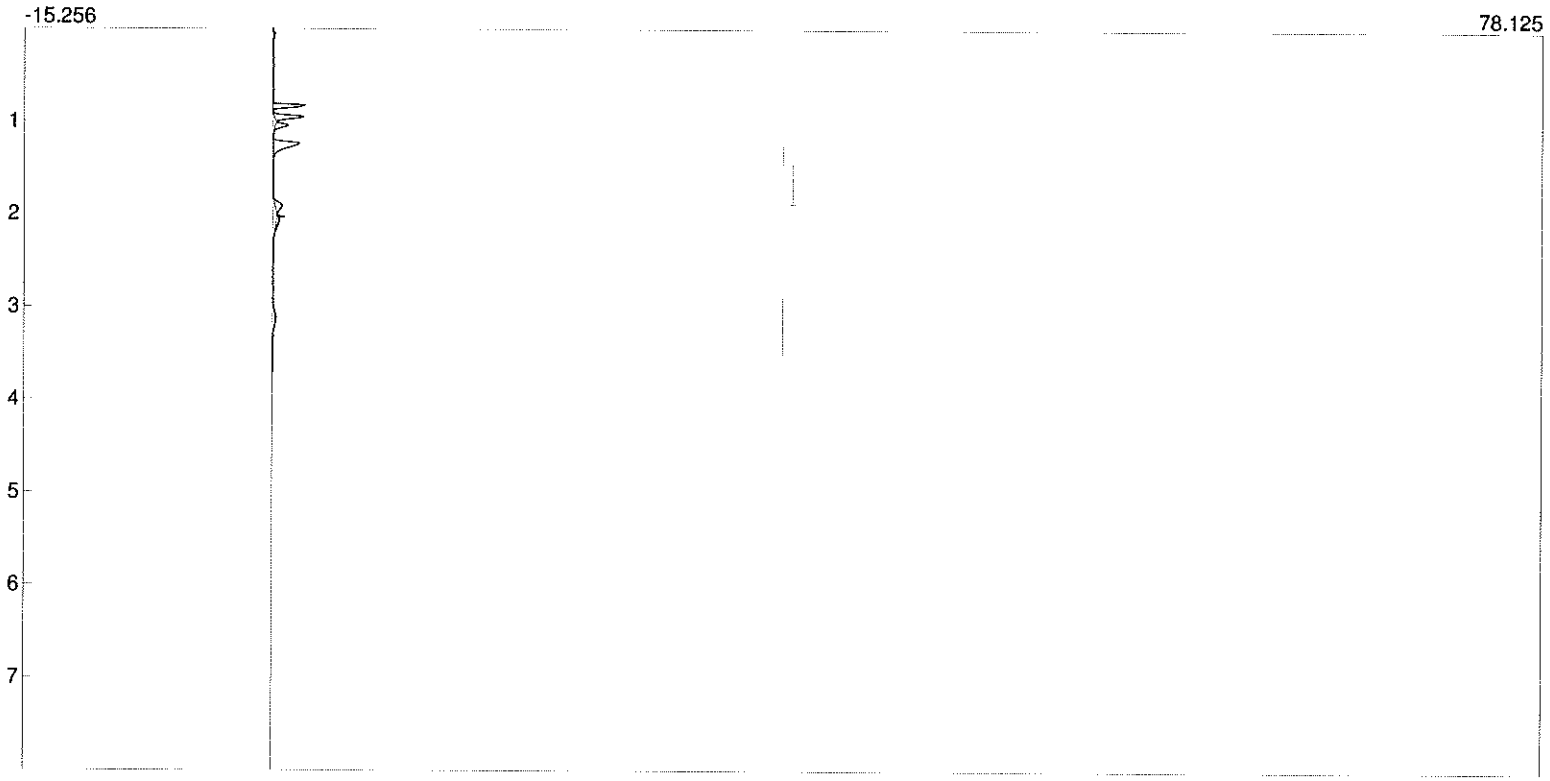
The table below contains the results of testing and calcultions performed on the date(s) listed.
The testing was performed in accordance with 40 CFR Part 60, Appendix B, Performance Specification 7

Fuel Drum			
TIME	RM	CEMS	Dif
9:52	0.00	3.89	-3.89
10:07	0.00	3.88	-3.88
10:24	0.00	3.42	-3.42
10:40	0.00	2.27	-2.27
11:06	0.00	4.32	-4.32
11:28	0.00	3.62	-3.62
11:45	0.00	2.70	-2.70
12:02	0.00	3.61	-3.61
12:18	0.00	3.37	-3.37
12:34	0.00	4.06	-4.06
12:49	0.00	2.21	-2.21
13:06	0.00	3.34	-3.34
13:22	0.00	4.72	-4.72
13:37	0.00	5.64	-5.64
13:46	0.00	4.72	-4.72
13:56	0.00	4.94	-4.94
Average	**0.00**	**3.79**	**-3.79**

RM AVERAGE:	0.0000	ppmv
CEMS AVERAGE:	3.7944	ppmv
ARITHMETIC MEAN:	-3.7944	
STANDARD DEVIATION:	0.9458	
CONFIDENCE COEFFICIENT:	0.5039	
ACCURACY VS. RM AVERAGE:	**>100**	%
ACCURACY VS. APPLICABLE STANDARD:	**2.7**	%

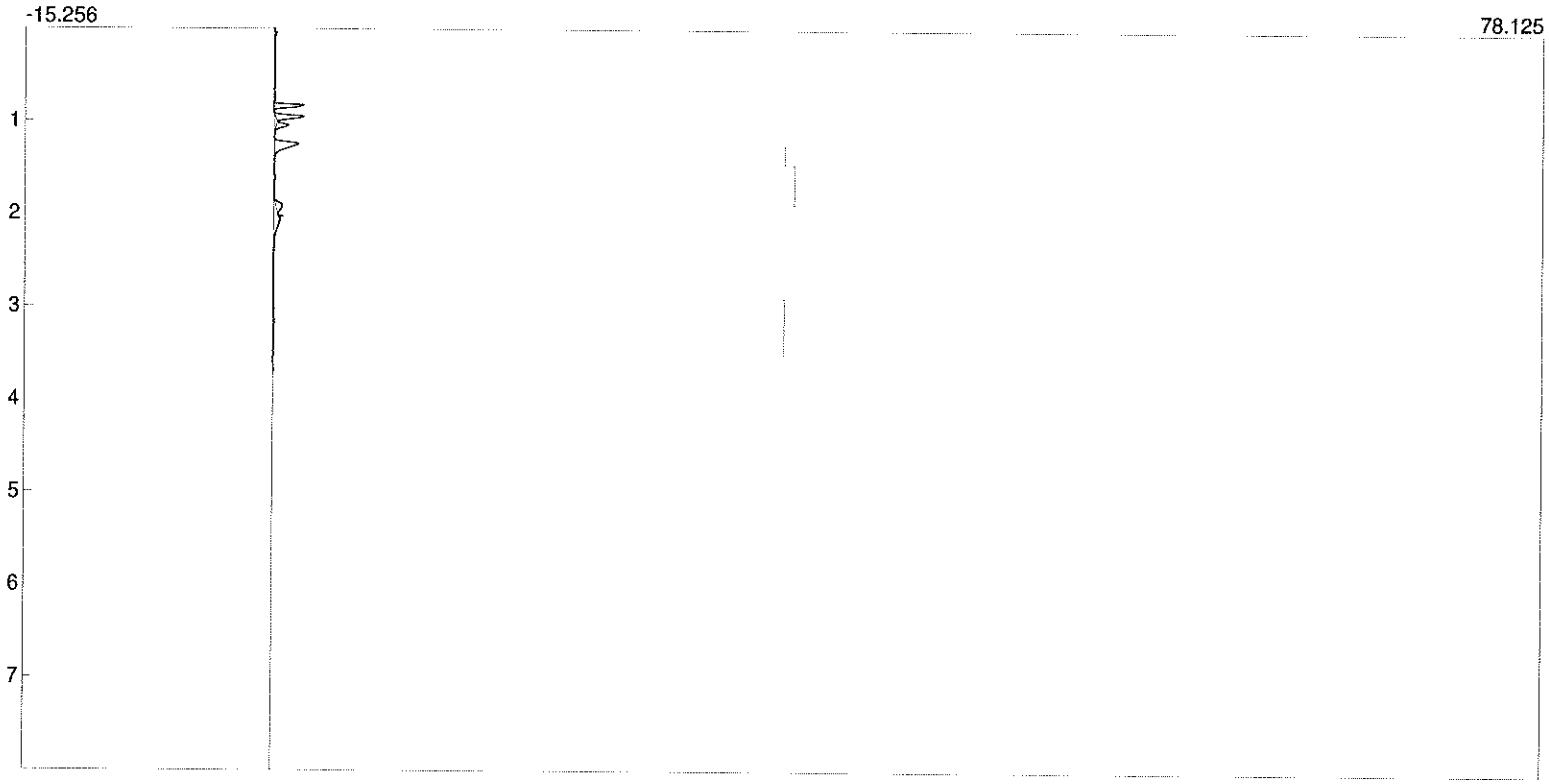
THE ABOVE DATA CERTIFIES THAT THE C.E.M. FOR WHICH THIS DATA IS
PROVIDED PASSES ___X___, FAILS _____ THE RELATIVE ACCURACY TEST

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_07.CHR ()
Sample: FD Run 1



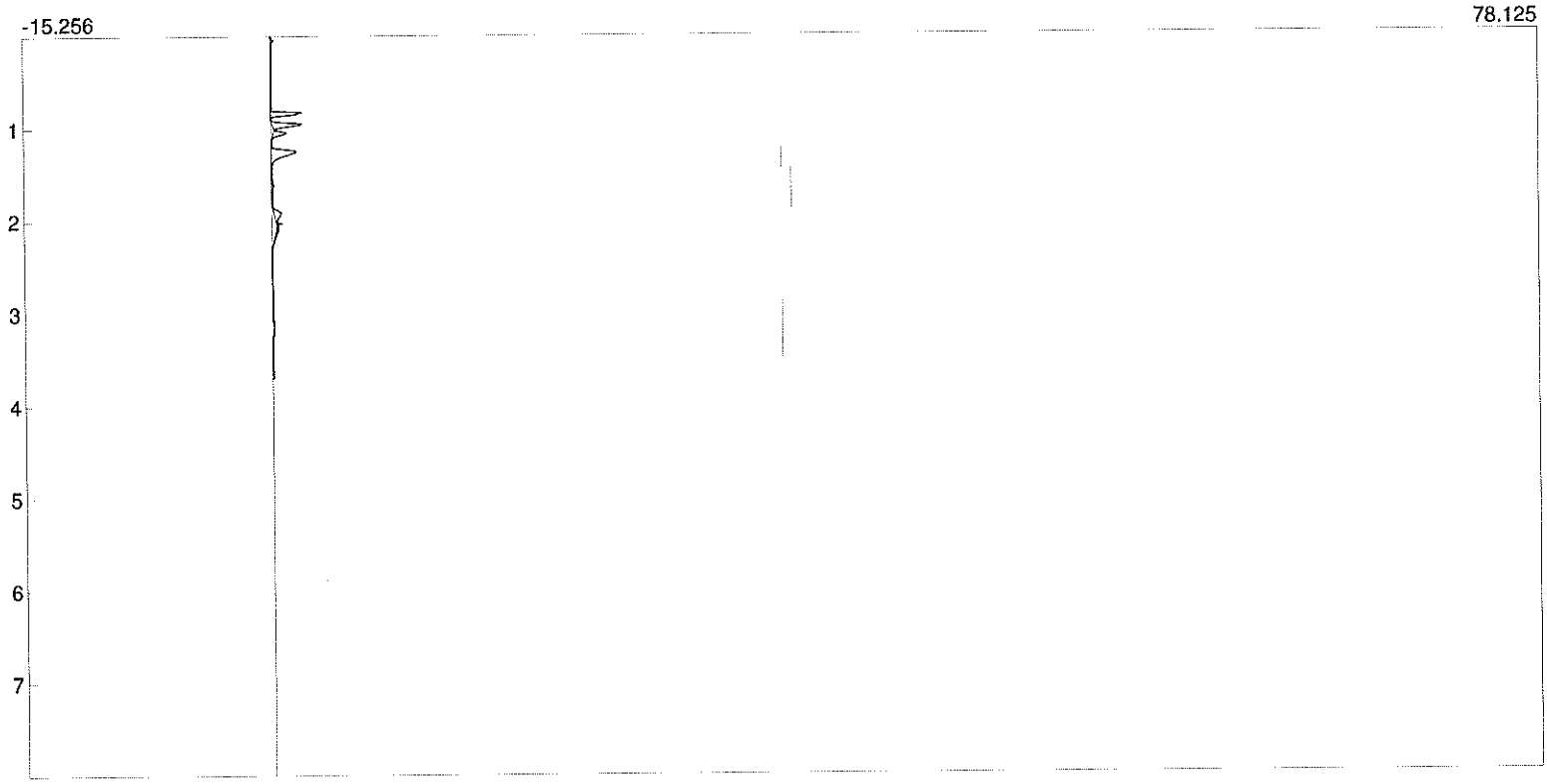
Component	Retention	External	Units
	0.0000		

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_08.CHR ()
Sample: FD Run 2



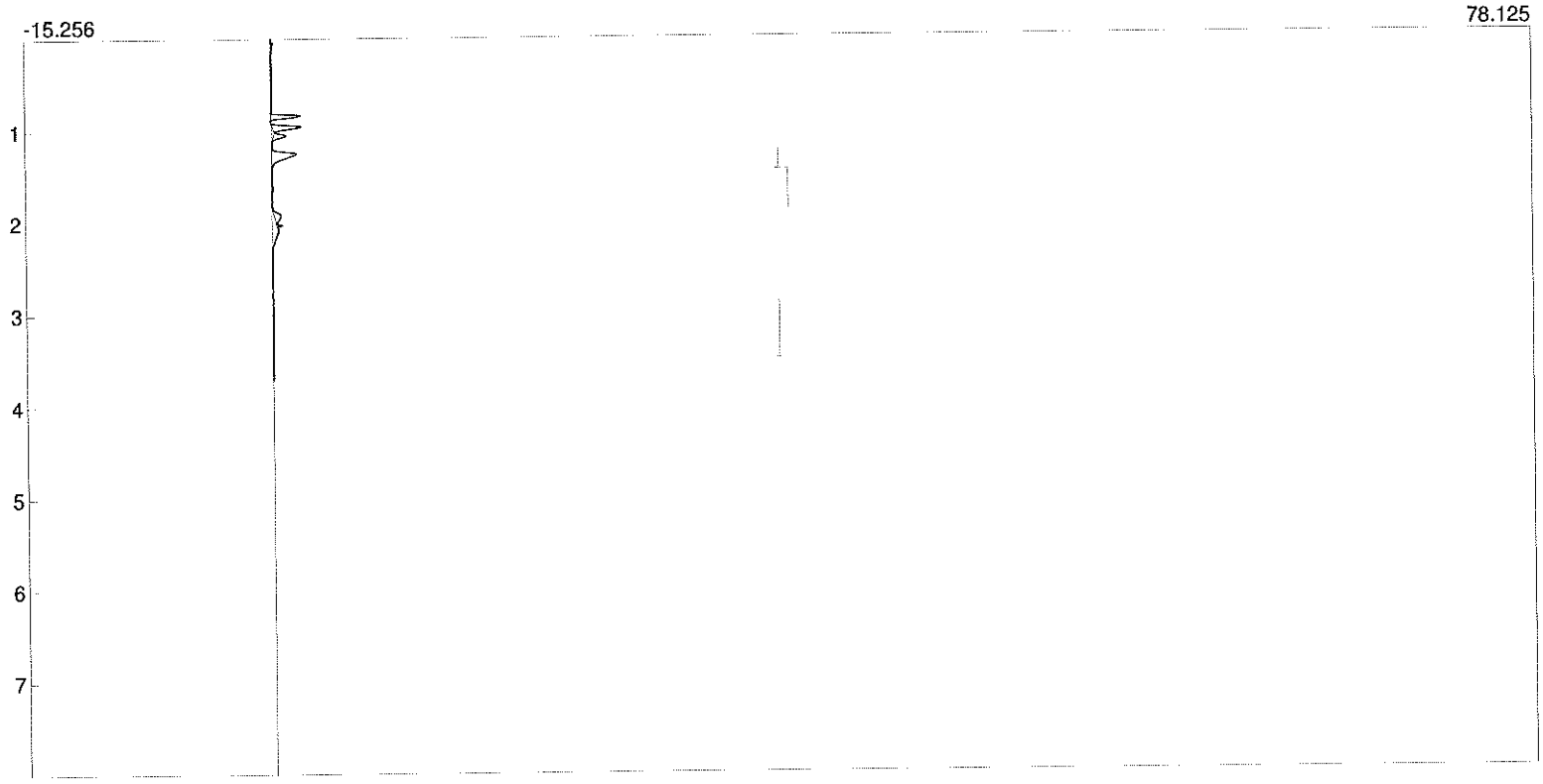
Component	Retention	External	Units
	0.0000		

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_09.CHR ()
Sample: FD Run 3



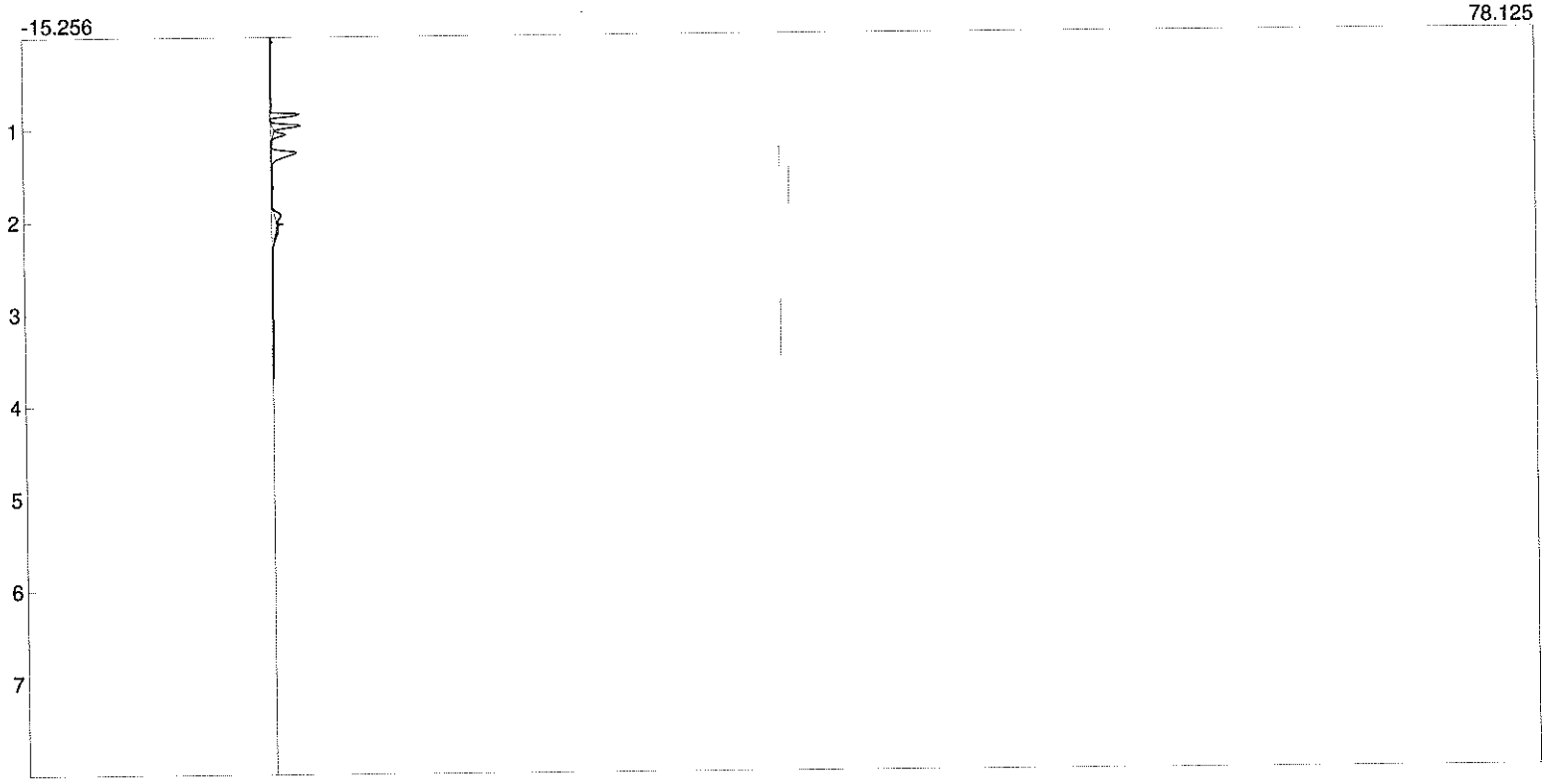
Component	Retention	External	Units
	0.0000		

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_10.CHR ()
Sample: FD Run 4



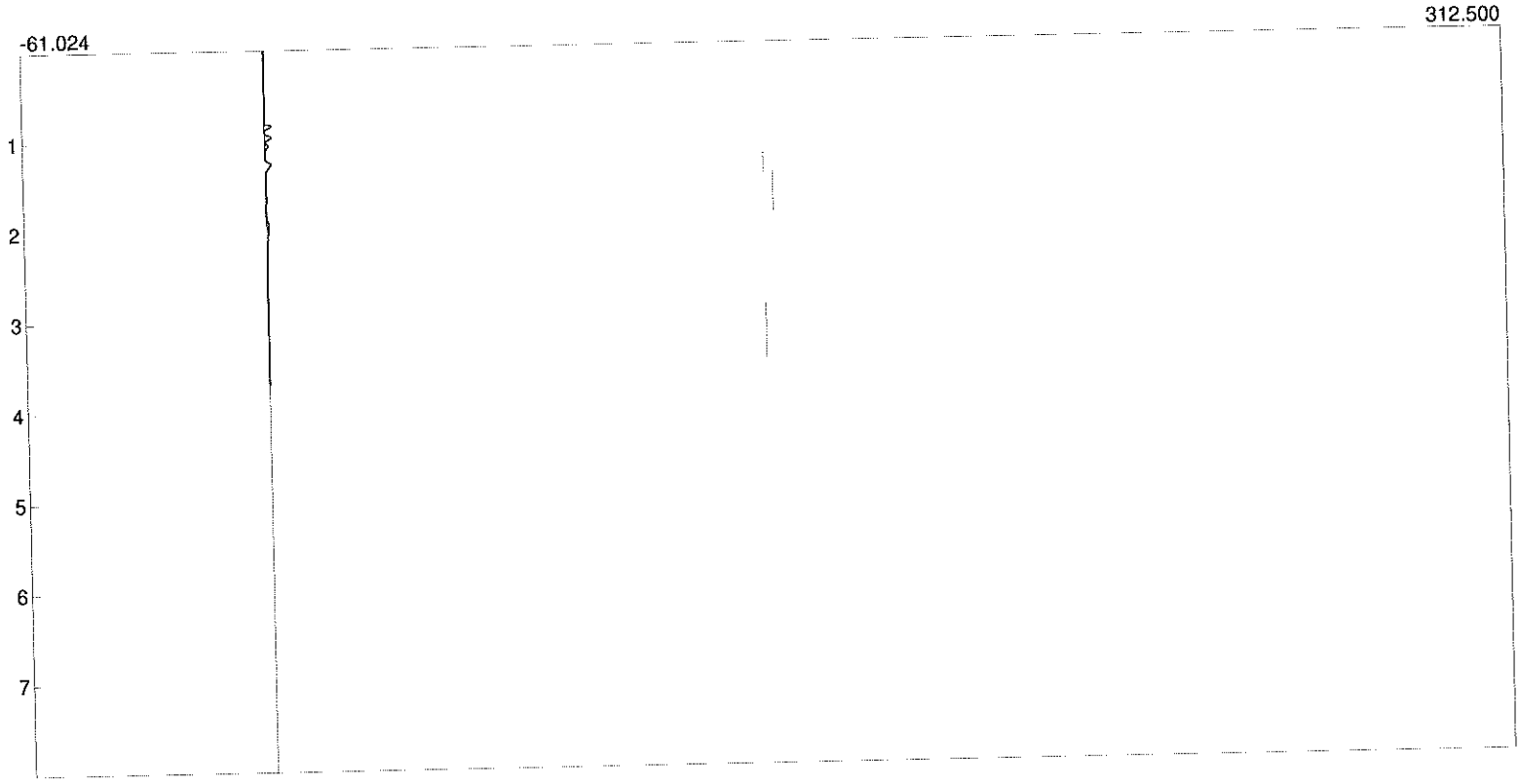
Component	Retention	External	Units
	0.0000		

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_11.CHR ()
Sample: FD Run 5



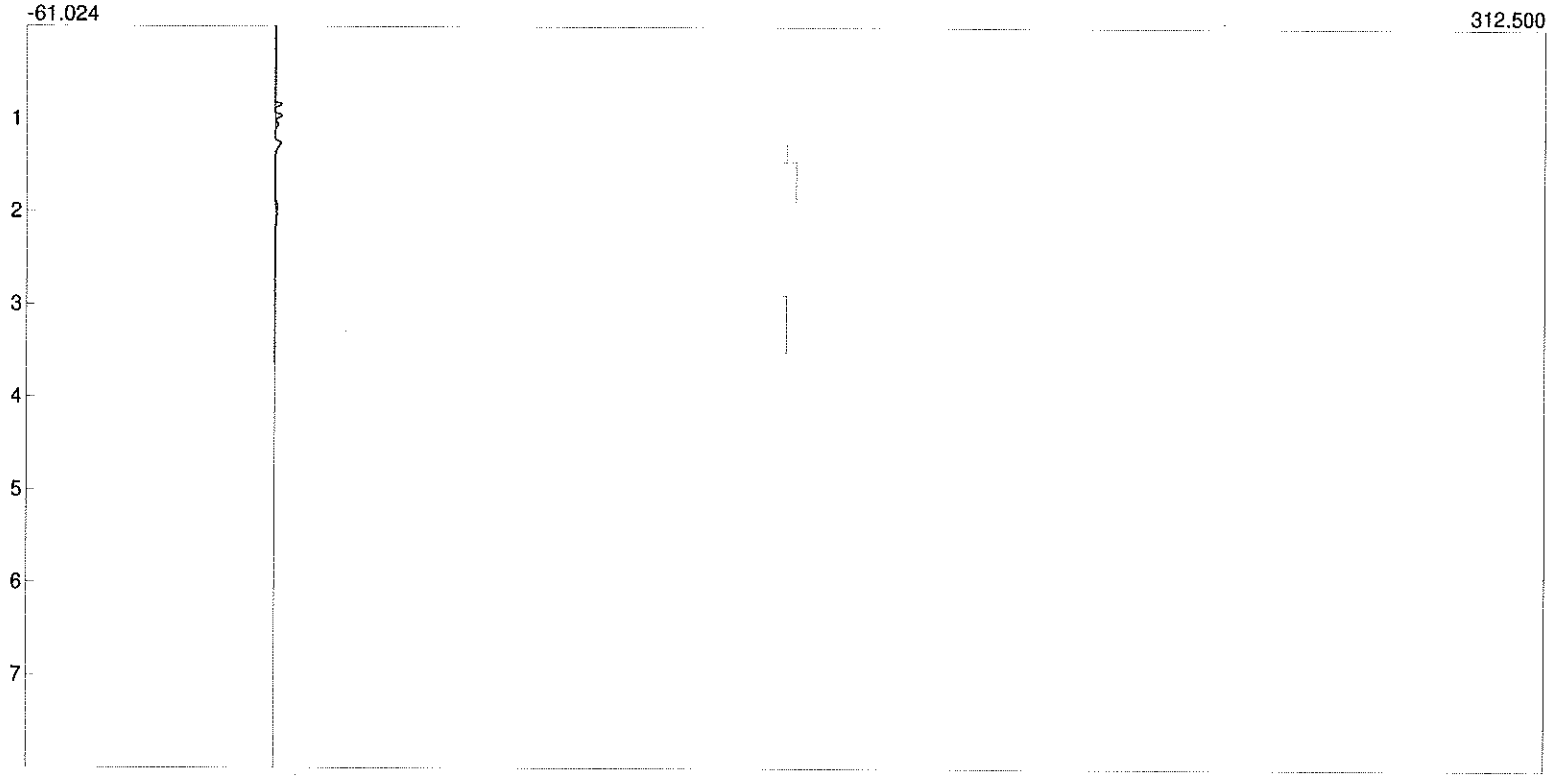
Component	Retention	External	Units
	0.0000		

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_20.CHR ()
Sample: FD Run 6



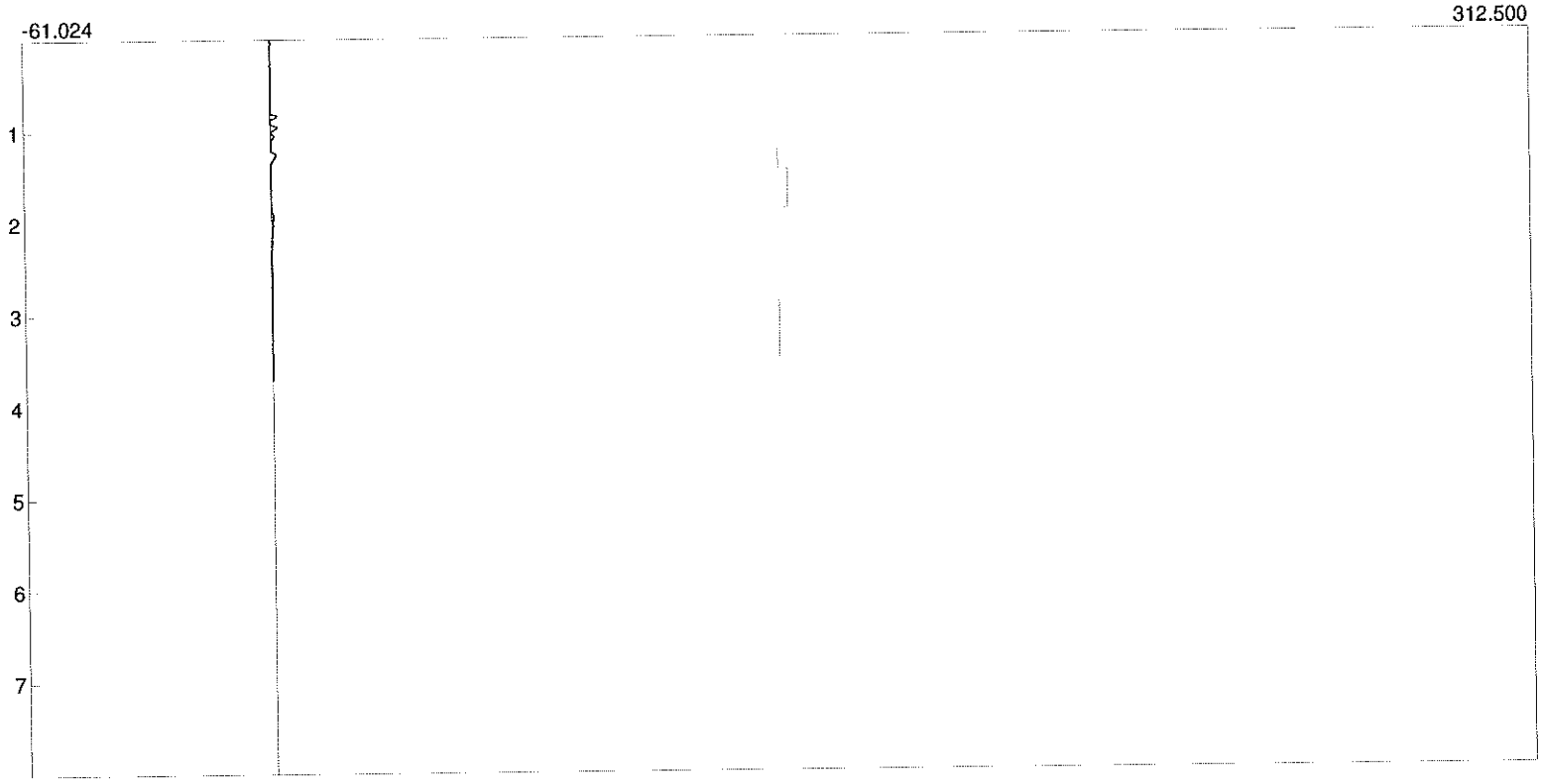
Component	Retention	External	Units
	0.0000		

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_21.CHR ()
Sample: FD Run 7



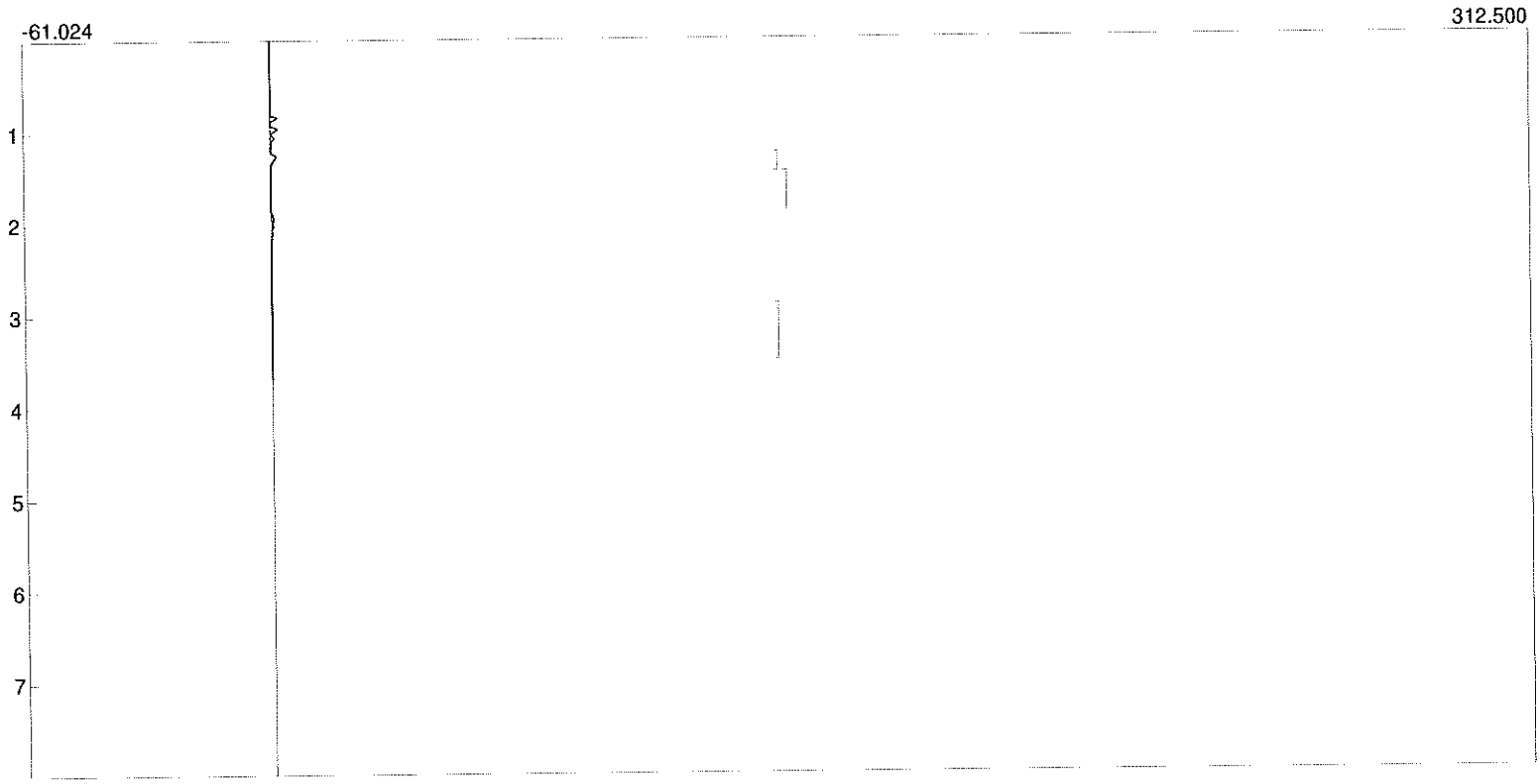
Component	Retention	External	Units
	0.0000		

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_22.CHR ()
Sample: FD Run 8



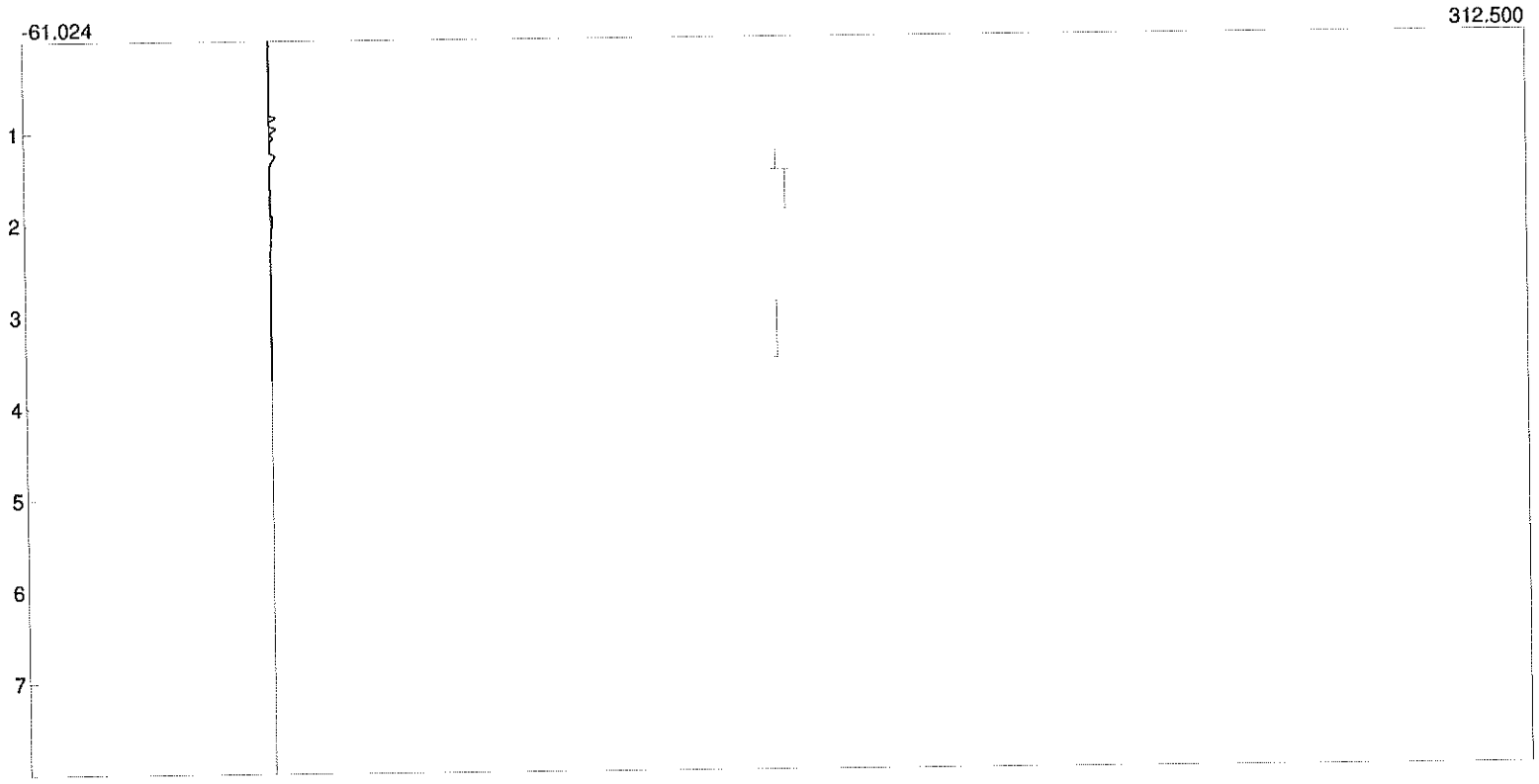
Component	Retention	External	Units
		0.0000	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_23.CHR ()
Sample: FD Run 9



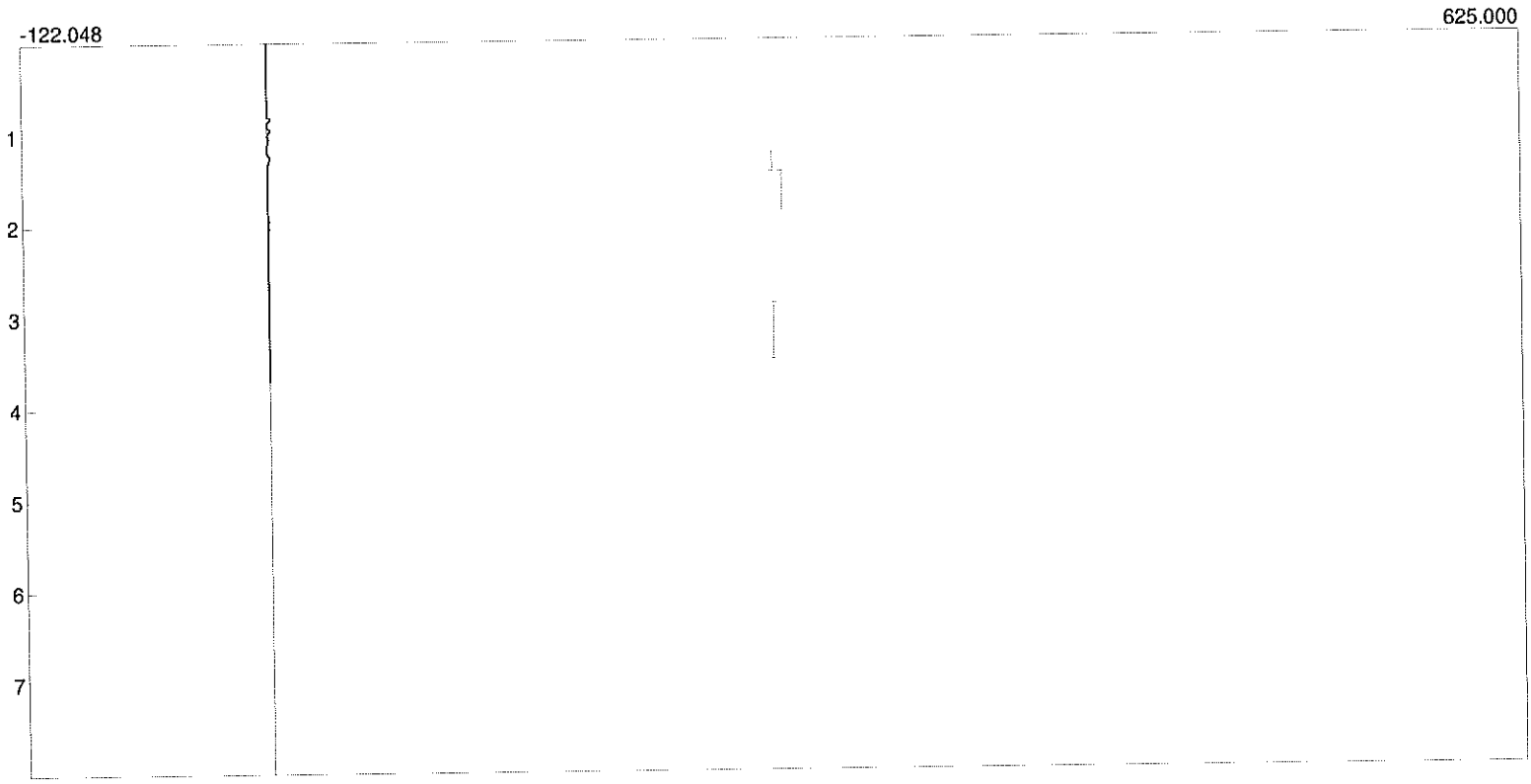
Component	Retention	External	Units
		0.0000	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_24.CHR ()
Sample: FD Run 10



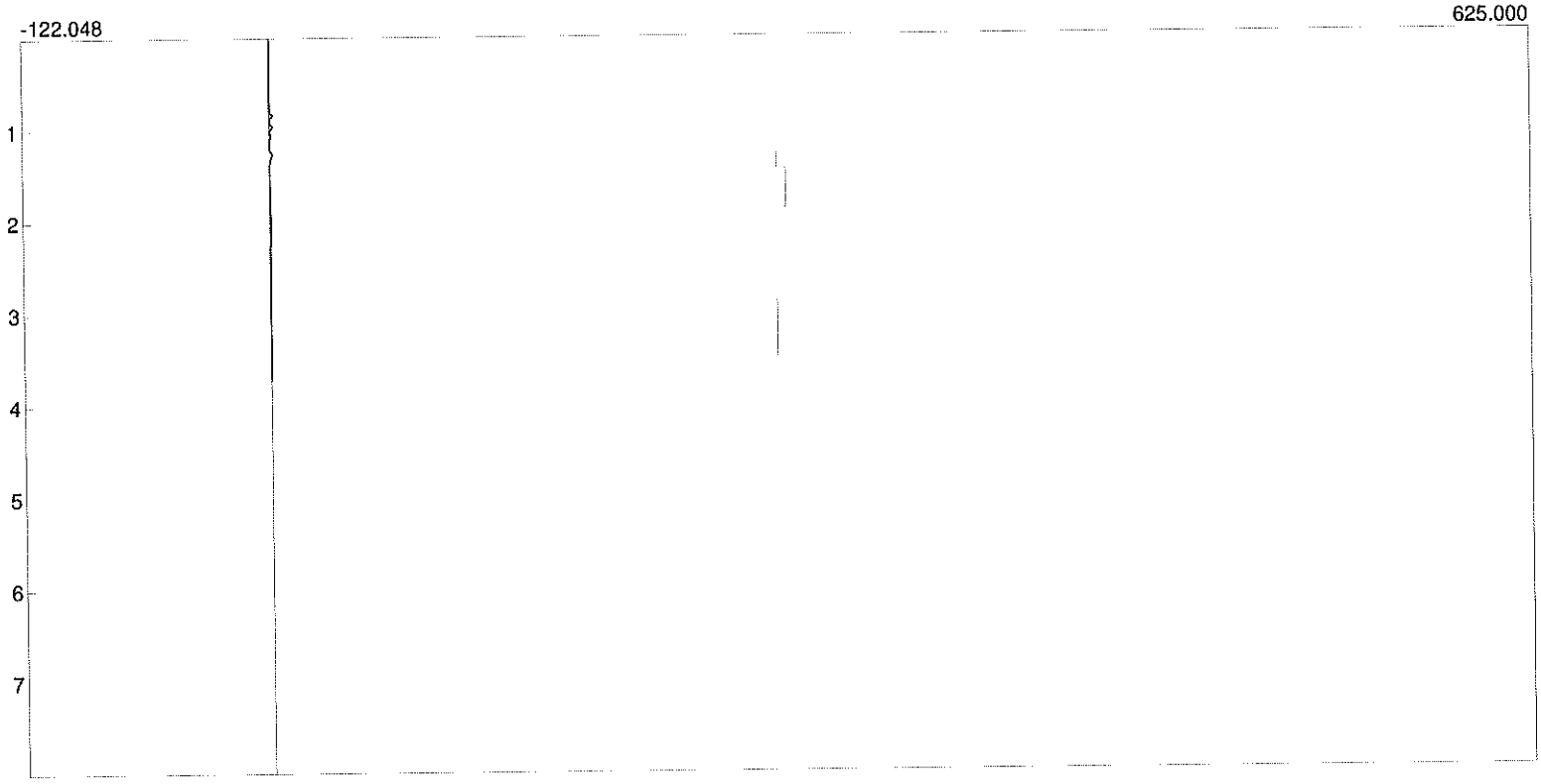
Component	Retention	External	Units
		0.0000	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_25.CHR ()
Sample: FD Run 11



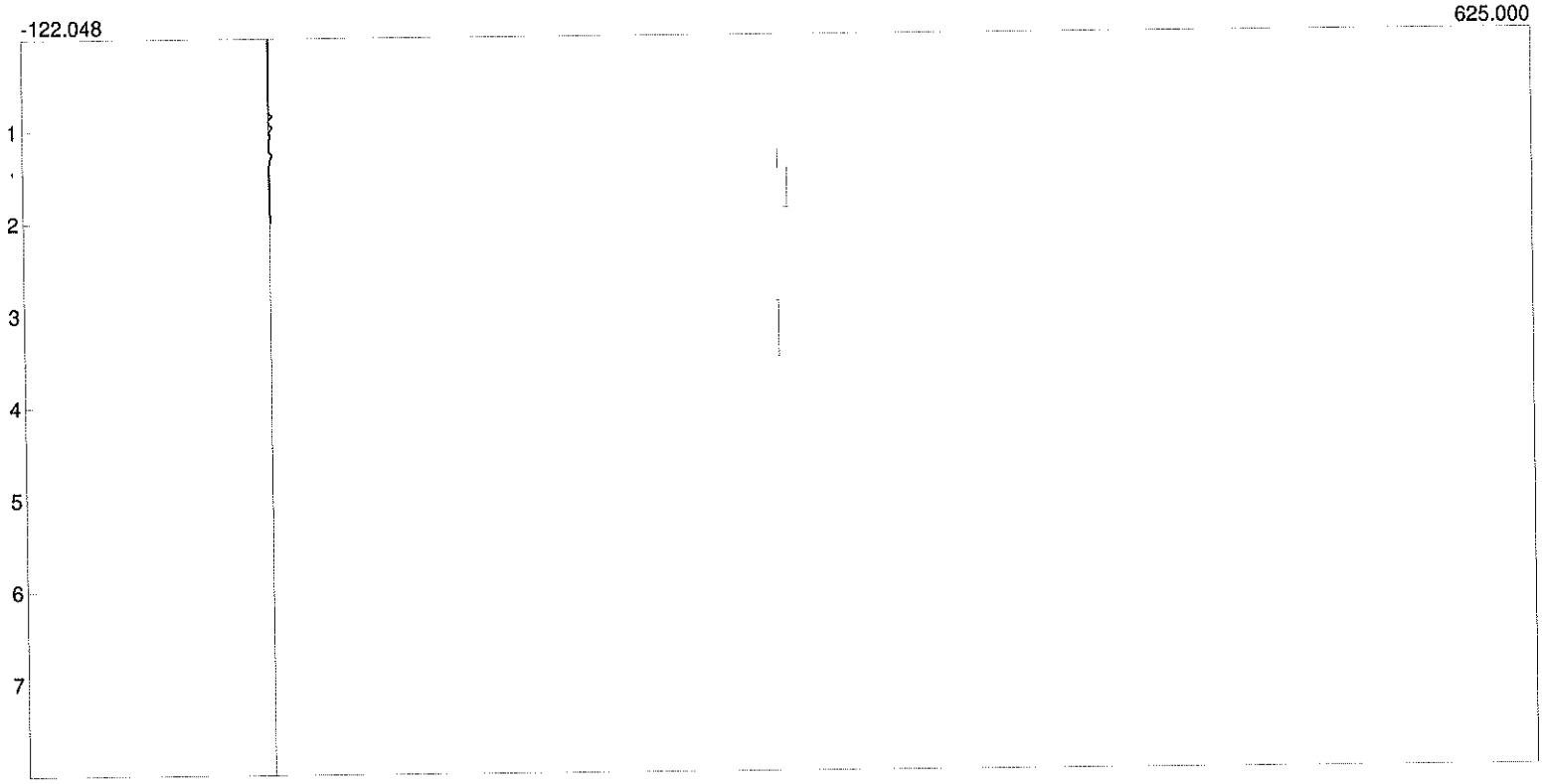
Component	Retention	External	Units
	0.0000		

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_26.CHR ()
Sample: FD Run 12



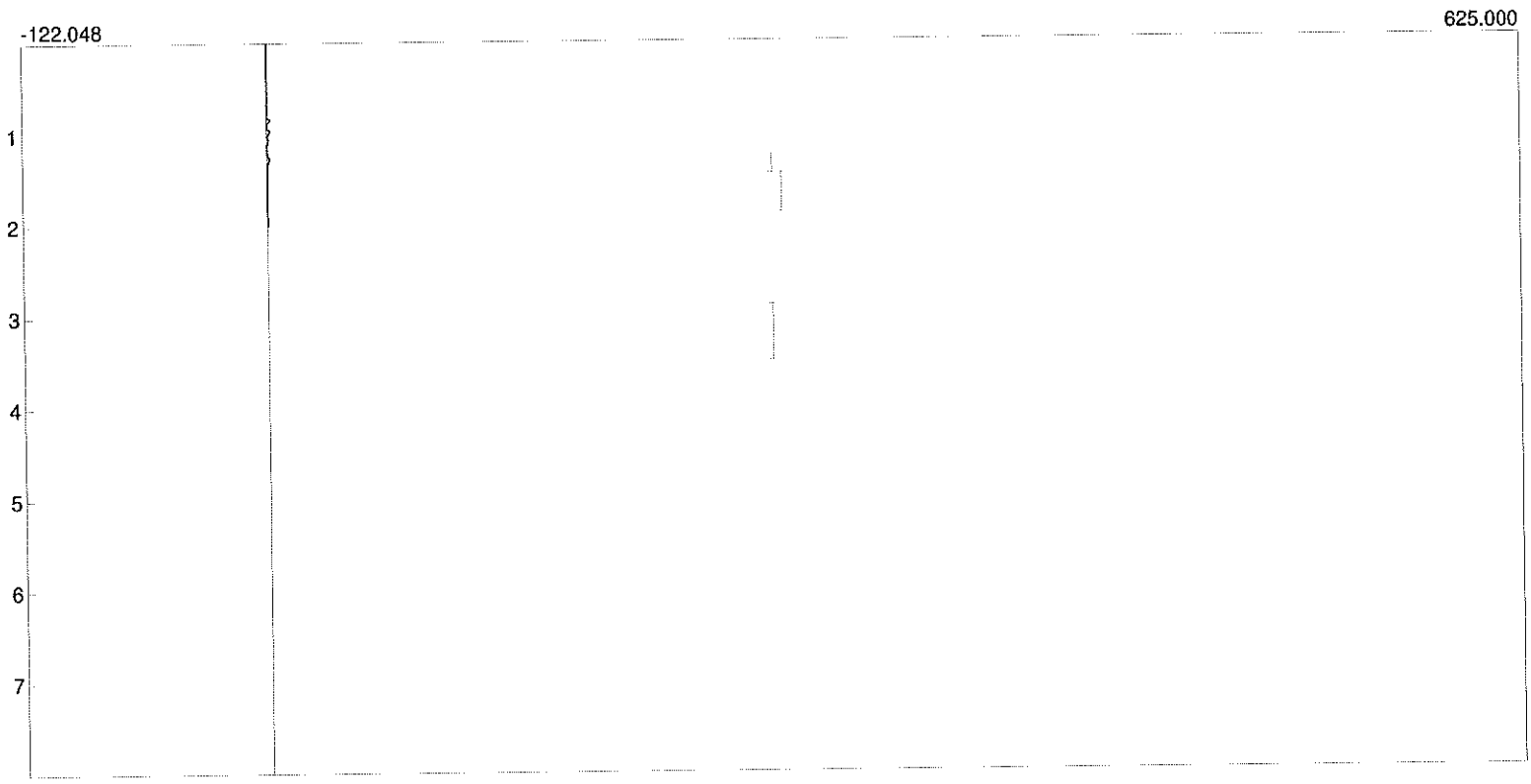
Component	Retention	External	Units
	0.0000		

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_27.CHR ()
Sample: FD Run 13



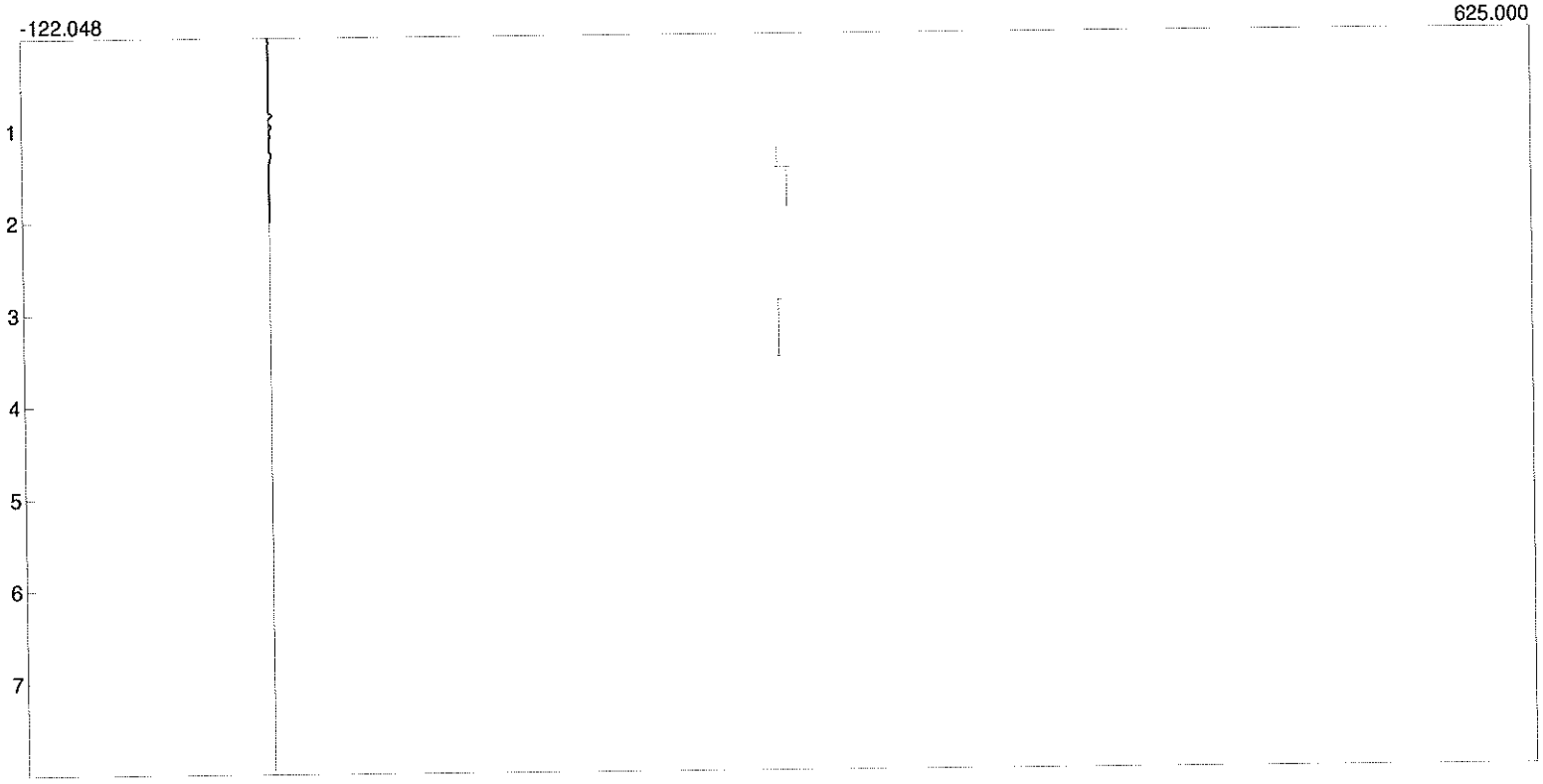
Component	Retention	External	Units
		0.0000	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_28.CHR ()
Sample: FD Run 14



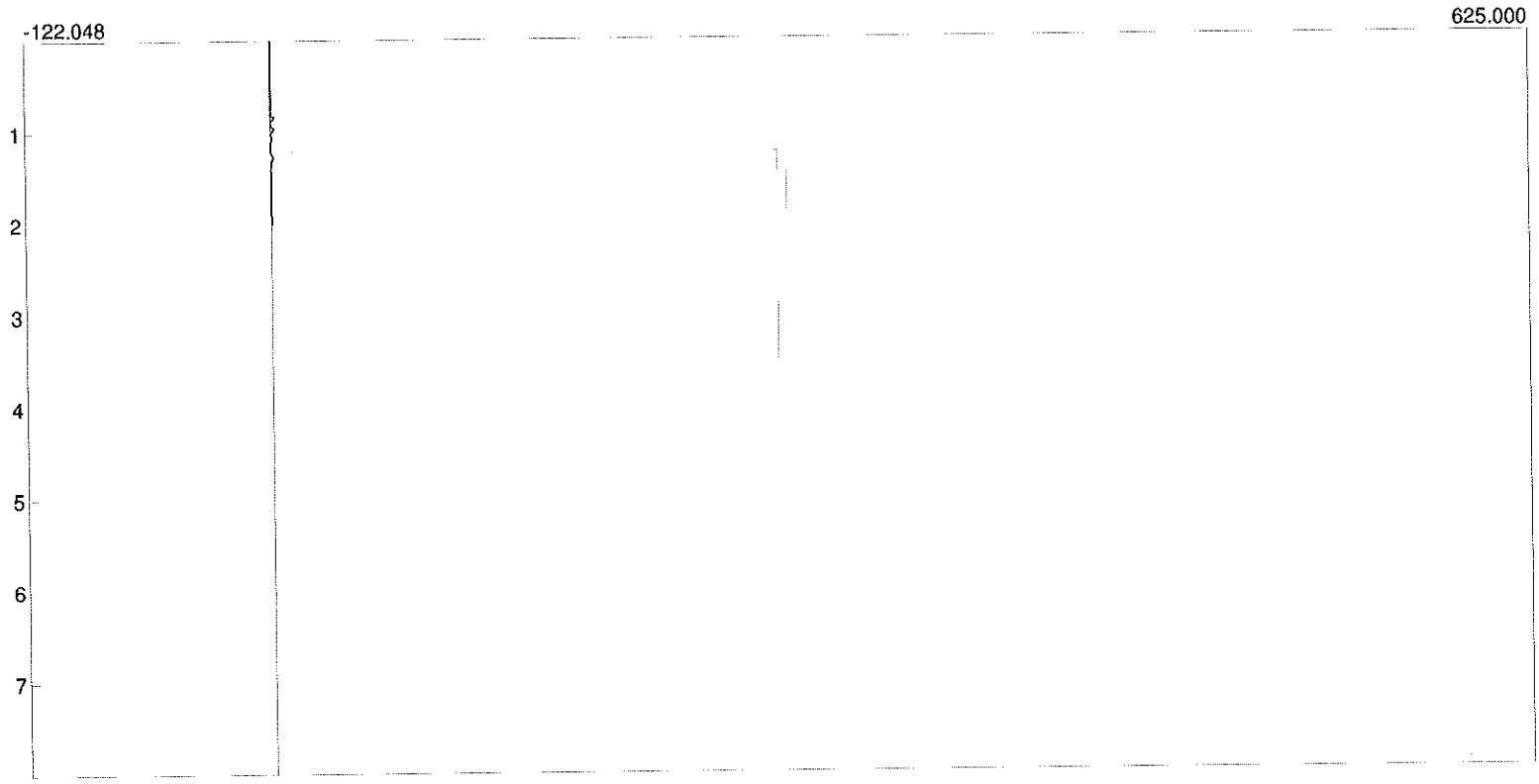
Component	Retention	External	Units
		0.0000	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_29.CHR ()
Sample: FD Run 15



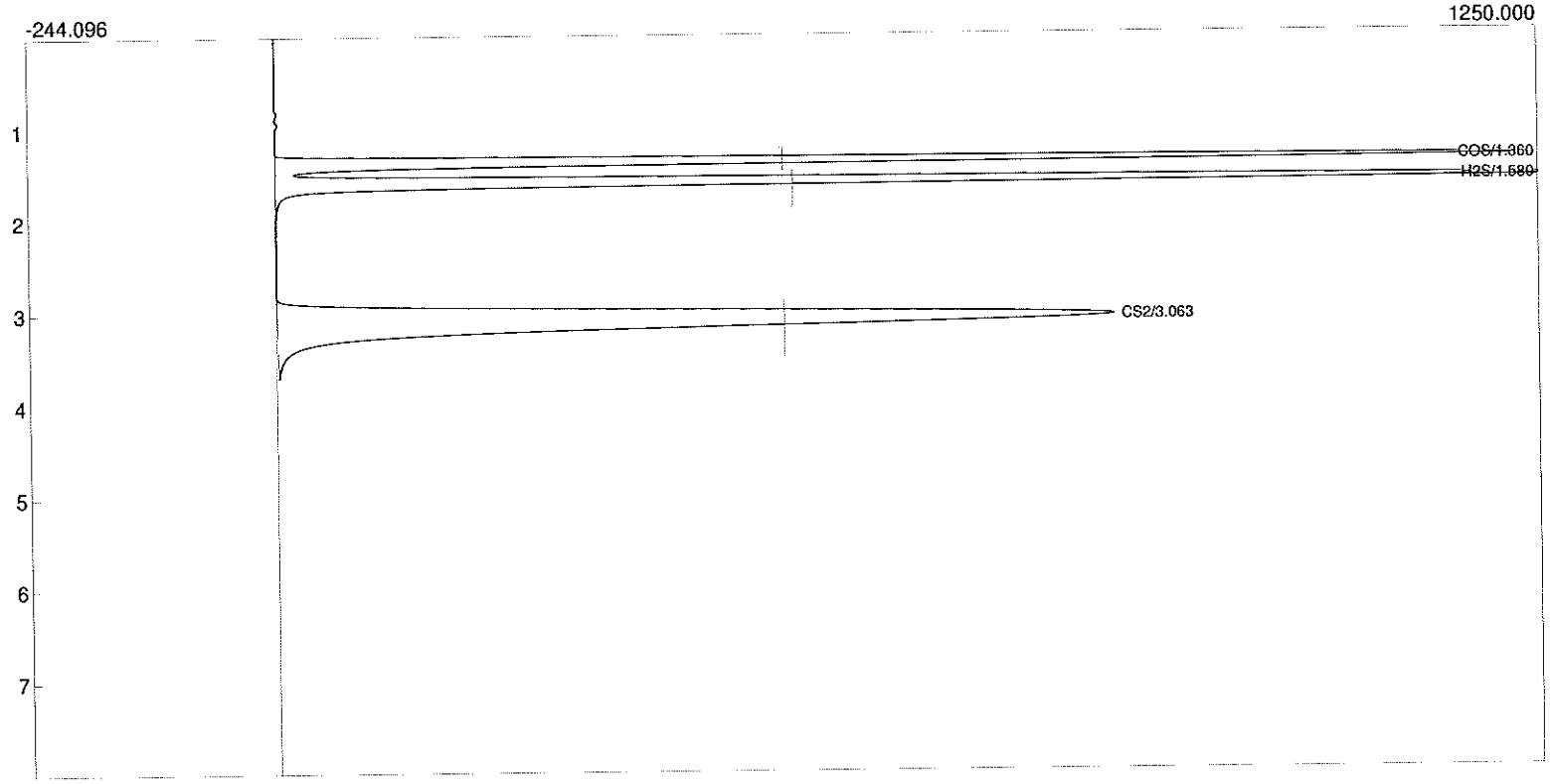
Component	Retention	External	Units
	0.0000		

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_30.CHR ()
Sample: FD Run 16



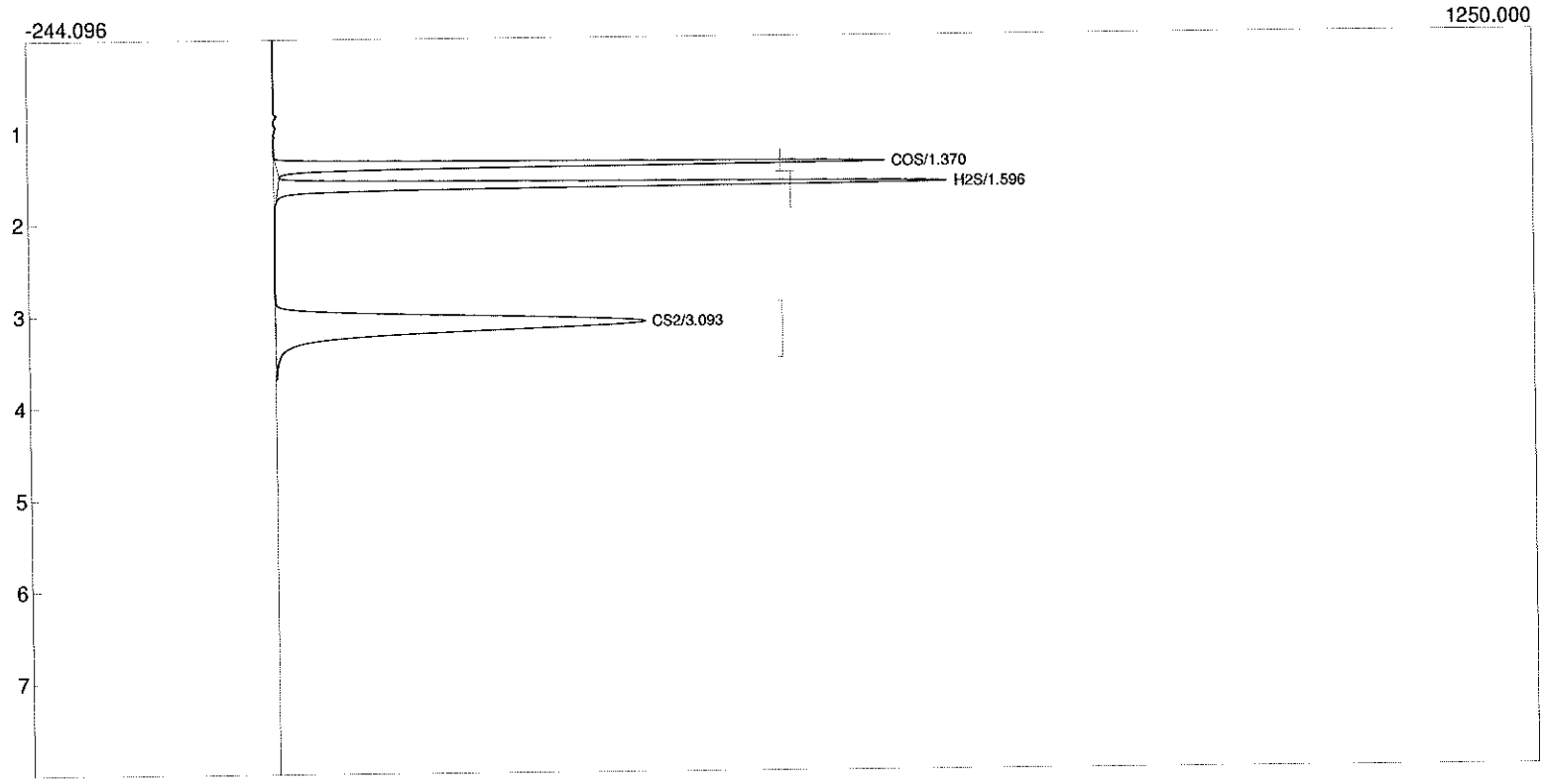
Component	Retention	External	Units
		0.0000	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_01.CHR ()
Sample: cal 488



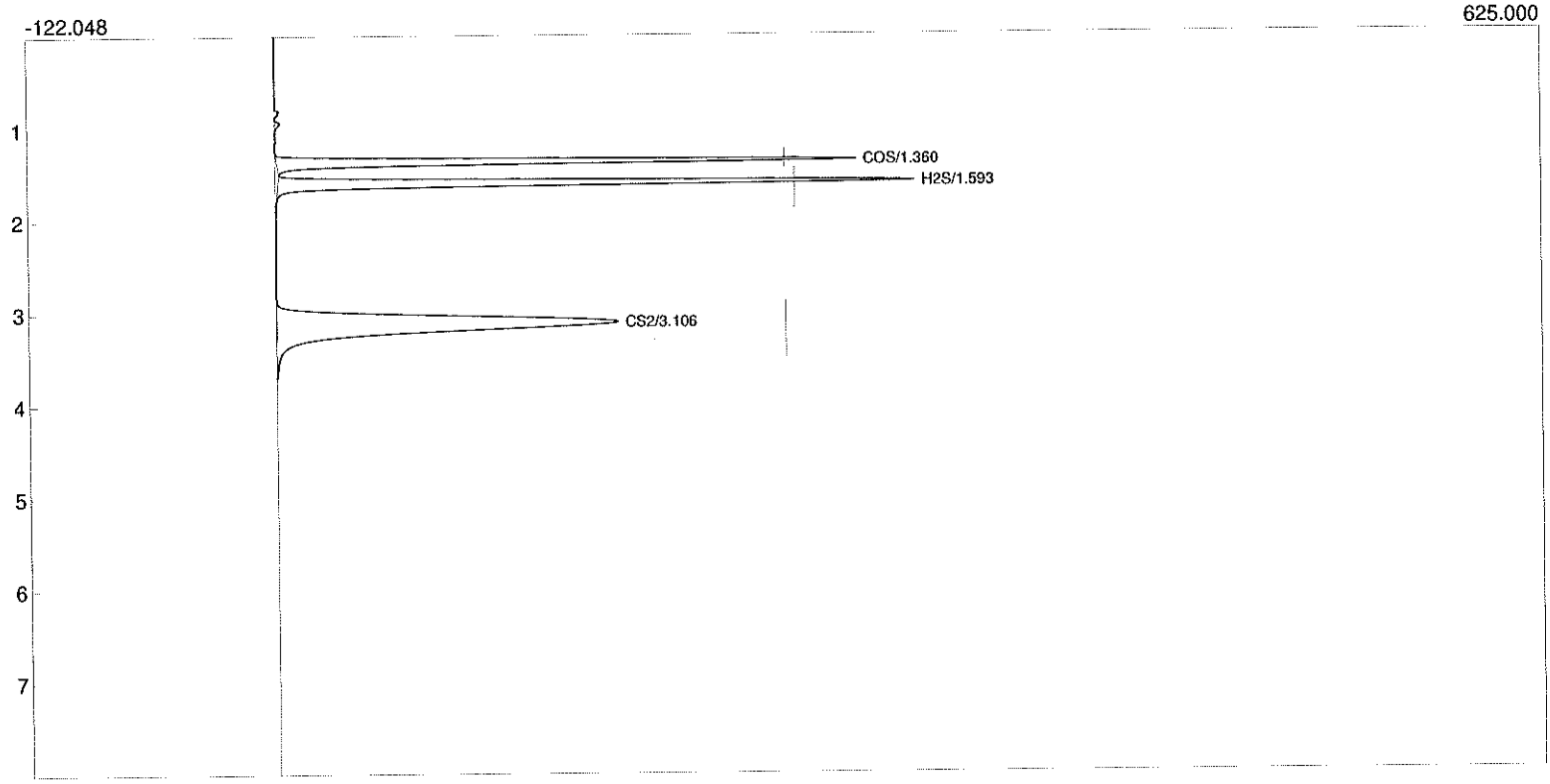
Component	Retention	External	Units
COS	1.360	481.1534	
H2S	1.580	488.1923	
CS2	3.063	509.4956	
		1478.8413	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_02.CHR ()
Sample: cal 244



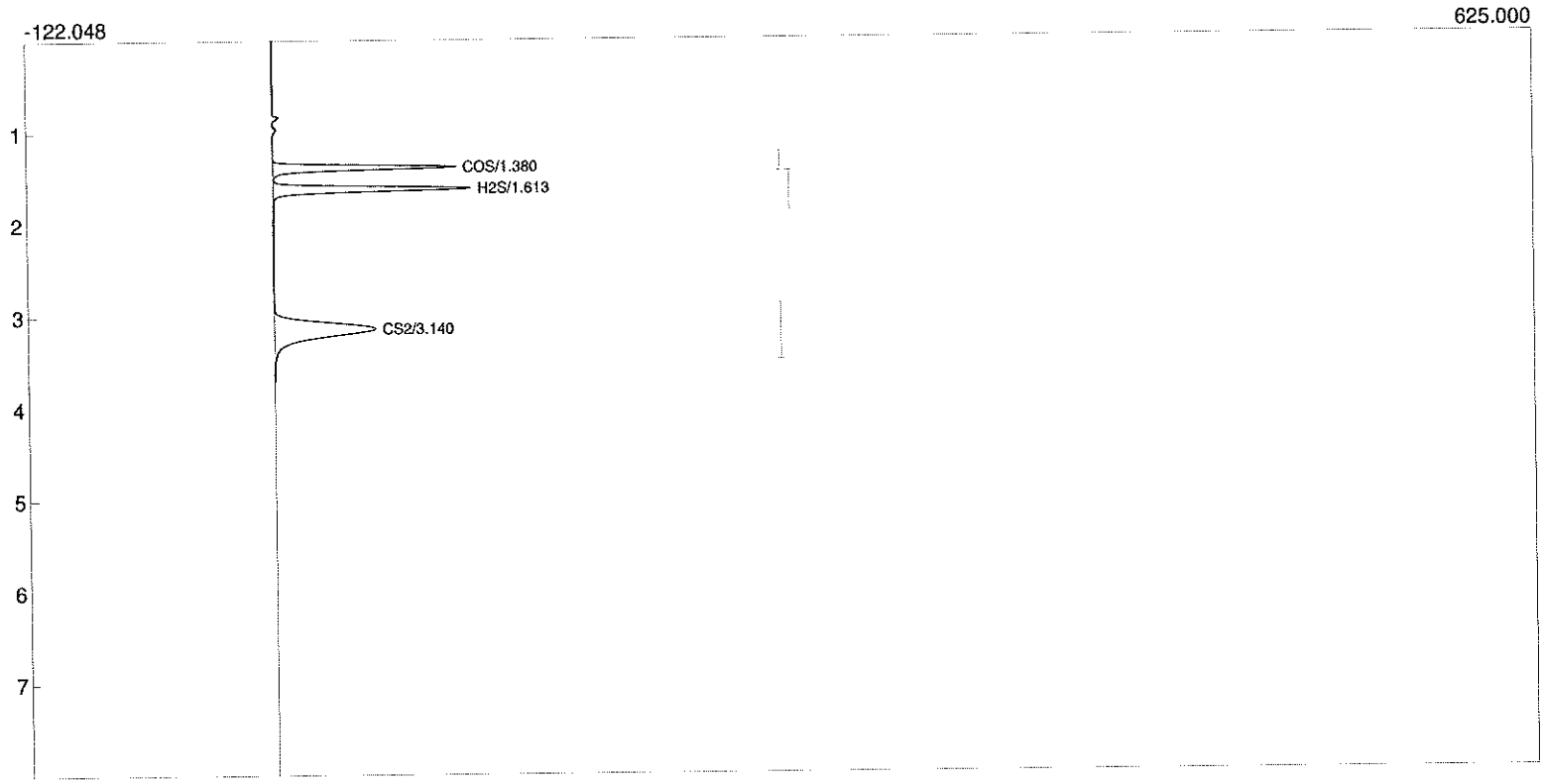
Component	Retention	External	Units
COS	1.370	240.6243	
H2S	1.596	244.0275	
CS2	3.093	254.7931	
		739.4450	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_03.CHR ()
Sample: cal 157



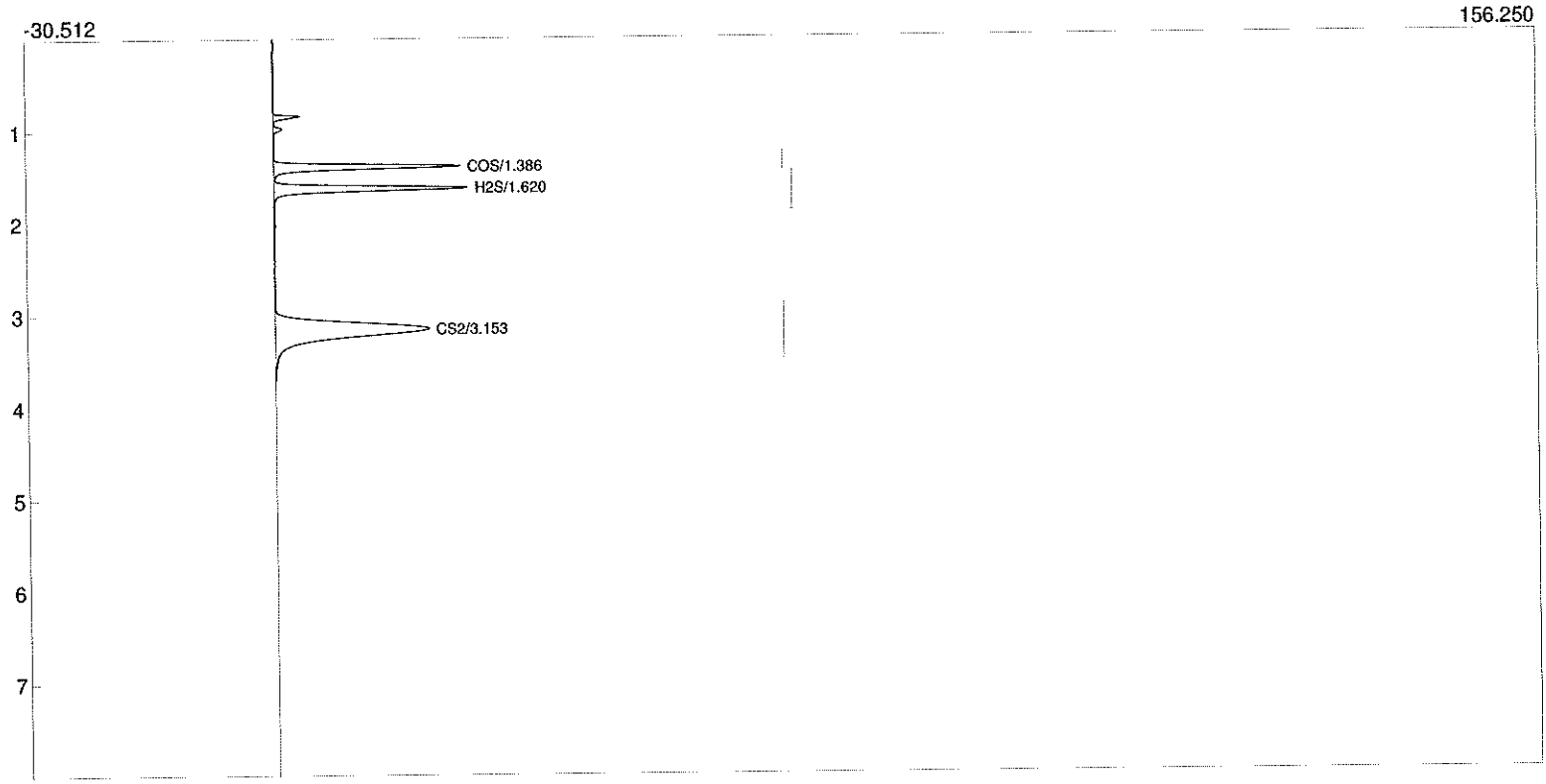
Component	Retention	External	Units
COS	1.360	157.4060	
H2S	1.593	154.6374	
CS2	3.106	161.3844	
		473.4277	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_04.CHR ()
Sample: cal 78



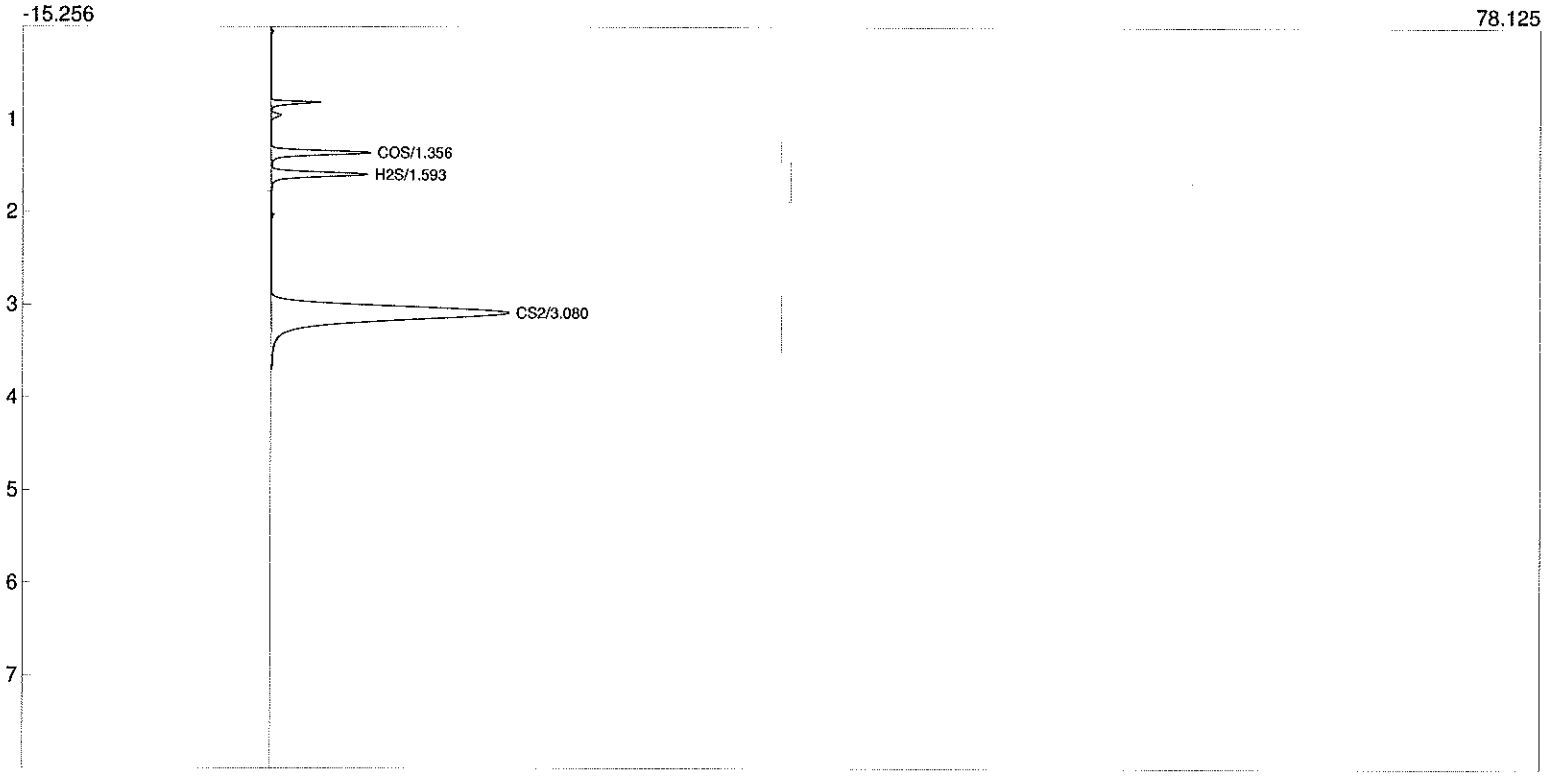
Component	Retention	External	Units
COS	1.380	78.7072	
H2S	1.613	77.3724	
CS2	3.140	80.7075	
		236.7871	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_05.CHR ()
Sample: cal 38



Component	Retention	External	Units
COS	1.386	39.3530	
H2S	1.620	38.6524	
CS2	3.153	40.4122	
		118.4176	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_06.CHR ()
Sample: cal 19



Component	Retention	External	Units
COS	1.356	19.6283	
H2S	1.593	19.3106	
CS2	3.080	20.1660	
		59.1050	

APPENDIX B – Yokogawa GC8000 H_2S CEMS Data

DeNovo Global Technologies, Inc.
CVREnergy - Wynnewod Refinery
Fuel Drum CEMS Data
Date is: 11/29/2016

Timestamp	Fuel gas H2S - ppm	
9:50:00	3.66	
9:51:00	3.77	
9:52:00	3.89	Run 1
9:53:00	3.88	
9:54:00	3.88	
9:55:00	4.23	
9:56:00	4.57	
9:57:00	4.57	
9:58:00	4.57	
9:59:00	3.88	
10:00:00	3.19	
10:01:00	3.19	
10:02:00	3.19	
10:03:00	3.77	
10:04:00	4.34	
10:05:00	4.34	
10:06:00	4.34	
10:07:00	3.88	Run 2
10:08:00	3.42	
10:09:00	3.42	
10:10:00	3.42	
10:11:00	3.88	
10:12:00	4.34	
10:13:00	4.34	
10:14:00	4.34	
10:15:00	4.22	
10:16:00	4.11	
10:17:00	4.11	
10:18:00	4.11	
10:19:00	5.03	
10:20:00	5.94	
10:21:00	5.94	
10:22:00	5.94	
10:23:00	4.68	
10:24:00	3.42	Run 3
10:25:00	3.42	
10:26:00	3.42	
10:27:00	5.36	
10:28:00	7.31	
10:29:00	7.31	
10:30:00	7.31	
10:31:00	6.05	
10:32:00	4.79	
10:33:00	4.79	
10:34:00	4.79	
10:35:00	4.90	
10:36:00	5.01	
10:37:00	5.02	
10:38:00	5.02	
10:39:00	3.64	
10:40:00	2.27	Run 4
10:41:00	2.27	
10:42:00	2.27	
10:43:00	5.13	
10:44:00	8.00	
10:45:00	8.00	
10:46:00	8.00	
10:47:00	6.62	
10:48:00	5.24	
10:49:00	5.24	
10:50:00	5.24	
10:51:00	5.13	
10:52:00	5.02	
10:53:00	5.01	
10:54:00	5.01	
10:55:00	6.73	
10:56:00	8.45	
10:57:00	8.45	
10:58:00	8.45	
10:59:00	7.99	
11:00:00	7.53	
11:01:00	7.53	
11:02:00	7.53	
11:03:00	5.92	
11:04:00	4.32	
11:05:00	4.32	

11:06:00	4.32	Run 5
11:07:00	6.04	
11:08:00	7.76	
11:09:00	7.76	
11:10:00	7.75	
11:11:00	7.64	
11:12:00	7.52	
11:13:00	7.52	
11:14:00	7.52	
11:15:00	6.15	
11:16:00	4.77	
11:17:00	4.77	
11:18:00	4.77	
11:19:00	4.20	
11:20:00	3.62	
11:21:00	3.63	
11:22:00	3.63	
11:23:00	4.31	
11:24:00	5.00	
11:25:00	5.00	
11:26:00	5.00	
11:27:00	4.31	
11:28:00	3.62	Run 6
11:29:00	3.62	
11:30:00	3.62	
11:31:00	4.19	
11:32:00	4.76	
11:33:00	4.76	
11:34:00	4.76	
11:35:00	3.74	
11:36:00	2.70	
11:37:00	2.70	
11:38:00	2.70	
11:39:00	3.50	
11:40:00	4.31	
11:41:00	4.30	
11:42:00	4.31	
11:43:00	3.50	
11:44:00	2.70	
11:45:00	2.70	Run 7
11:46:00	2.70	
11:47:00	3.73	
11:48:00	4.76	
11:49:00	4.76	
11:50:00	4.76	
11:51:00	3.84	
11:52:00	2.92	
11:53:00	2.93	
11:54:00	2.93	
11:55:00	3.61	
11:56:00	4.30	
11:57:00	4.30	
11:58:00	4.30	
11:59:00	3.95	
12:00:00	3.61	
12:01:00	3.61	
12:02:00	3.61	Run 8
12:03:00	3.84	
12:04:00	4.07	
12:05:00	4.07	
12:06:00	4.07	
12:07:00	3.95	
12:08:00	3.84	
12:09:00	3.84	
12:10:00	3.84	
12:11:00	3.84	
12:12:00	3.84	
12:13:00	3.84	
12:14:00	3.84	
12:15:00	3.60	
12:16:00	3.37	
12:17:00	3.37	

12:18:00	3.37	Run 9
12:19:00	4.06	
12:20:00	4.75	
12:21:00	4.75	
12:22:00	4.75	
12:23:00	4.29	
12:24:00	3.83	
12:25:00	3.83	
12:26:00	3.83	
12:27:00	3.94	
12:28:00	4.06	
12:29:00	4.06	
12:30:00	4.06	
12:31:00	4.05	
12:32:00	4.05	
12:33:00	4.05	
12:34:00	4.06	Run 10
12:35:00	4.29	
12:36:00	4.52	
12:37:00	4.52	
12:38:00	4.52	
12:39:00	4.29	
12:40:00	4.05	
12:41:00	4.05	
12:42:00	4.06	
12:43:00	4.40	
12:44:00	4.74	
12:45:00	4.74	
12:46:00	4.73	
12:47:00	3.47	
12:48:00	2.21	
12:49:00	2.21	Run 11
12:50:00	2.21	
12:51:00	3.58	
12:52:00	4.95	
12:53:00	4.95	
12:54:00	4.96	
12:55:00	4.27	
12:56:00	3.59	
12:57:00	3.59	
12:58:00	3.59	
12:59:00	4.38	
13:00:00	5.18	
13:01:00	5.18	
13:02:00	5.18	
13:03:00	4.27	
13:04:00	3.35	
13:05:00	3.35	
13:06:00	3.34	Run 12
13:07:00	4.48	
13:08:00	5.63	
13:09:00	5.64	
13:10:00	5.64	
13:11:00	5.07	
13:12:00	4.49	
13:13:00	4.49	
13:14:00	4.49	
13:15:00	7.00	
13:16:00	9.52	
13:17:00	9.52	
13:18:00	9.53	
13:19:00	7.12	
13:20:00	4.72	
13:21:00	4.72	

13:22:00	4.72	Run 13
13:23:00	7.36	
13:24:00	9.99	
13:25:00	9.99	
13:26:00	9.99	
13:27:00	9.87	
13:28:00	9.76	
13:29:00	9.75	
13:30:00	9.75	
13:31:00	9.30	
13:32:00	8.84	
13:33:00	8.84	
13:34:00	8.84	
13:35:00	7.23	
13:36:00	5.63	
13:37:00	5.64	Run 14
13:38:00	5.64	
13:39:00	7.25	
13:40:00	8.85	
13:41:00	8.85	
13:42:00	8.85	
13:43:00	6.78	
13:44:00	4.72	
13:45:00	4.72	
13:46:00	4.72	Run 15
13:47:00	7.24	
13:48:00	9.75	
13:49:00	9.75	
13:50:00	9.75	
13:51:00	7.46	
13:52:00	5.17	
13:53:00	5.17	
13:54:00	5.18	
13:55:00	5.06	
13:56:00	4.94	Run 16
13:57:00	4.94	
13:58:00	4.94	

APPENDIX C - Gas Calibration Certificates / Support Documentation

Airgas
an Air Liquide company

Airgas USA, LLC
616 Miller Cut Off Rd.
LaPorte, TX 77571
281-842-6900
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: PRIMARY STANDARD

Customer: DENOVO GLOBAL TECHNOLOGIES INC - LA PORTE , TX
Part Number: X05ME78P33A0000
Cylinder Number: FF48905
Laboratory: 124 - LaPorte Mix (SAP) - TX
Analysis Date: Oct 19, 2016
Lot Number: 126-400785023-1

Reference Number: 126-400785023-1
Cylinder Volume: 31.7 CF

Cylinder Pressure: 1606 PSIG
Valve Outlet: 330

Expiration Date: Oct 19, 2017

Primary Standard Gas Mixtures are traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration (Mole %)	Analytical Uncertainty
CARBON DISULFIDE	150.0 PPM	161.4 PPM	+/- 1%
CARBONYL SULFIDE	150.0 PPM	157.4 PPM	+/- 1%
HYDROGEN SULFIDE	150.0 PPM	154.7 PPM	+/- 1%
ETHANE	21.00 %	21.01 %	+/- 1%
METHANE	Balance		

Notes:
RECERTIFICATION
DENOVO GLOBAL TECHNOLOGIES INC
PO#: RECERT 9/29/2016

Approved for Release

Airgas

Airgas USA, LLC
616 Miller Cut Off Road
Laporte, TX 77571
281-842-6900
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: CERTIFIED STANDARD-SPEC

Customer:	DENOVO GLOBAL TECHNOLOGIES INC - LAPORTE, TX		
Part Number:	X05ME78C33A0040	Reference Number:	126-400732979-1
Cylinder Number:	FF37344	Cylinder Volume:	42 CF
Laboratory:	ASG - LaPorte Mix (SAP) - TX	Cylinder Pressure:	2015 PSIG
Analysis Date:	Jul 05, 2016	Valve Outlet:	330
Lot Number:	126-400732979-1		

Expiration Date: Jul 05, 2017

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration (Mole %)	Analytical Uncertainty
CARBON DISULFIDE	500.0 PPM	509.6 PPM	+/- 2%
CARBONYL SULFIDE	500.0 PPM	481.2 PPM	+/- 2%
HYDROGEN SULFIDE	500.0 PPM	488.2 PPM	+/- 2%
ETHANE	21.00 %	21.02 %	+/- 2%
METHANE	Balance		

Notes:.
PO# DGT-7305

Approved for Release

APPENDIX D - Example Calculations

EXAMPLE CALCULATIONS

Correction for raw emission concentrations to bias/drift corrected values:

Eq. 1:

$$Ccorrected = \frac{(Cmeasured - Co) * Cmo}{(Cm - Co)}$$

where:

$C_{corrected}$ = Average calibration corrected concentration, ppm or percent

$C_{measured}$ = Average measured concentration, ppm, or percent

C_O = Average of pre- and post-test system bias response for the zero gas, ppm or percent

C_m = Average of pre- and post-test system bias response for the upscale gas, ppm or percent

C_{ma} = Actual concentration of the upscale gas, ppm or percent

RELATIVE ACCURACY CALCULATIONS

Arithmetic Mean:

Eq. 2:

$$D = \frac{1}{n}\sum_{i=1}^{n} di$$

where:

D = Arithmetic mean of the difference between the RM and CEMS value

n = Number of data points

di = Difference between the RM and CEMS for individual data points

Standard Deviation Calculation:

Eq. 3:

$$Sd = \left[\frac{\sum_{i=1}^{n} di^2 - [\sum_{i=1}^{n} di]^2}{n-1}\right]^{1/2}$$

where:

Sd = Standard deviation of the difference between the RM and CEMS value

Confidence Coefficient Calculation:

Eq. 4:

$$CC = t_{0.975} * \frac{Sd}{\sqrt{n}}$$

where:

CC = Two Tailed confidence coefficient corresponding to 2.5% error

$t_{0.975}$ = t-value correcting for –1 degrees of freedom = 2.306

Relative Accuracy of CEMS to RM Calculation:

Eq. 5:

$$RA = \left[\frac{|\bar{d}| + |CC|}{\overline{RM}}\right]$$

where:

RA	=	Relative accuracy of the CEMS system to the RM
D	=	Absolute value of the mean of the differences
CC	=	Absolute value of the confidence coefficient
RM	=	Average RM value or the applicable emission standard

Emission Rate Calculation lbs/MMBtu:

Eq 6:

$$E = \frac{Ccorrected * MW}{385.33 * 10^6} Fd \left[\frac{20.9}{20.9 - \%\, O2\ dry}\right]$$

Where:

E	=	Pollutant emission rate, ng/J (lbs/million Btu).
$C_{corrected}$	=	Average calibration corrected concentration, ppm or percent
MW	=	Molecular weight of compound, lbs/lb-mol
F_d	=	Volume of combustion components per unit of heat content, scm/J (scf/million Btu).
$\%O_{2d}$	=	Concentration of oxygen on a dry basis, percent.

APPENDIX E - Quality Assurance / Quality Control

QUALITY ASSURANCE / QUALITY CONTROL

Specific quality control measures were used to insure the generation of reliable data from all sampling and analysis activities. Proper collection and organization of information followed by clear and concise reporting of the data was a primary goal in the project.

The objective of a quality assurance/quality control (QA/QC) program is to ensure that the precision and accuracy of all environmental data generated by DeNovo Global Technologies, Inc. is commensurate with data quality objectives (DQOs). DQOs are based on a common understanding of the intended end use(s) of the data, the measurement process, and the availability of resources. Once DQOs are established, formally or informally, QC protocol can be defined for the measurements.

In this project, the final data users will be Wynnewood Refining Company, USEPA Region VII and the State of Oklahoma. The DQOs for this project are to generate legally defensible data to be used to demonstrate compliance with Federal regulations associated with NSPS Subpart J, Db and state operating permit requirements related to annual certification of continuous emission monitoring systems (CEMS).

Two basic goals of a QC program are to:

1) Control errors; and
2) Verify that the entire analytical method is operating within acceptable performance limits.

Use of qualified personnel, reliable and well-maintained equipment, appropriate calibrations and standards, and close supervision of all operations are important components of the QC program. The following sections describe the QC results for maintaining instruments and equipment in a state of calibration (defines the accuracy or bias error), results for measuring a continuously maintained state of cleanliness (eliminates interference or contamination), and the paper trail which documents that the methods were performed to instructions, calibrated within method performance standards, and/or traceable to National Technical Information Services (NTIS) standard reference materials. Standards of QA set forth in the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III (USEPA-600/4-77-027b) were strictly followed.

FIELD DATA REDUCTION

Example calculations are used in the field to check on sampling conditions and a list of formulas used to reduce the field data. The data collected was reviewed in the field by the Project Manager. Errors or discrepancies were noted on the data sheet. Appendices of this report present the standardized forms that were used to record field sampling data.

INTERNAL QC CHECKS AND FREQUENCY

QC checks were performed to ensure the collection of representative samples and the generation of valid analytical results of these samples. These checks were performed by project participants throughout the program.

QA PROCEDURES

The following QA procedures were implemented during this test program:

- Use of designated sampling and analytical equipment. The sampling equipment used in this test met all calibration and operating criteria of the applicable ODEQ and USEPA Methods.

- Sampling system was calibrated and operated according to ODEQ and USEPA documented procedures. All site activities including audit results were logged into the daily site book.

- Equipment calibration - The mobile sampling equipment is calibrated with two concentrations of USEPA Protocol 1 gasses and a zero gas before the first test. Calibration span setting are check after each run. Other test equipment is calibrated in accordance with USEPA specifications in Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III (USEPA-600/4-77-027b).

DENOVO

December 12, 2016

Mr. David M. Heller
Environmental Engineer III
Wynnewood Refining Company
906 South Powell Street
Wynnewood, Oklahoma 73098

Re: South Flare – Yokogawa GC 8000 H_2s Gas Chromatographs Annual RATA Performance Test, CVR Energy, Wynnewood Refining Company, Wynnewood, Oklahoma

Dear Mr. Heller:

Enclosed are 3 hard copies and 1 copy on CD of the final test report for the South Flare – Yokogawa GC 8000 H_2s Gas Chromatographs Annual RATA Performance Test at the CVR Energy. – Wynnewood Refinery facility located in Wynnewood, Oklahoma.

If you have any questions or comments, please do not hesitate to call us at (281) 251-0399. DeNovo appreciates this opportunity and we look forward to continuing our successful and lasting relationship.

Sincerely,

Louis M. Esposito

Louis M. Esposito
Director
LME/th

17902 East Strack Drive, Spring, TX 77379
281.251.0399, http://www.denovogt.com

DENOVO

WYNNEWOOD REFINING™

A CVR Refining, LP Company

SOUTH FLARE
YOKOGAWA GC 8000 H_2S GAS CHROMATOGRAPH

2016 ANNUAL RATA PERFORMANCE TEST

CVR ENERGY – WYNNEWOOD REFINERY

WYNNEWOOD, OKLAHOMA

Final Report
December 12, 2016

Project # 5281.03.05

17902 East Strack Drive, Spring, TX 77379
281.251.0399, http://www.denovogt.com

SUMMARY

DeNovo Global Technologies, Inc. (DeNovo) conducted the Annual Relative Accuracy Test Audit (RATA) on the plant South Flare GC, H_2S Continuous Emissions Monitoring Systems (CEMS) associated with the CVR Energy. – Wynnewood Refining Company (WRC) petroleum refinery located in Wynnewood, Oklahoma. Annual certification testing was conducted on the South Flare Yokogawa GC 8000 H_2S Gas Chromatograph for the pollutant Hydrogen Sulfide (H_2S). The tests were performed to provide documentation of compliance with quality assurance provisions for the CEMS and process units as governed under Federal regulations associated with 40 CFR Part 60, 40 CFR Part 63 along with the facility state operating permit.

Testing was conducted on November 29, 2016. The test procedures were performed in accordance with 40 CFR, Part 60, Appendix B, utilizing a modified EPA Reference Methods 15 for the determination of H_2S. This report presents the results of that testing.

Mr. David M. Heller of Wynnewood Refining Company (WRC) was the project coordinator. The team leader for DeNovo was Mr. Louis Esposito.

BASED ON THE TEST RESULTS, THE SOUTH FLARE YOKOGAWA GC 8000 H_2S GAS CHROMATOGRAPHS PASSED THE 2016 ANNUAL RELATIVE ACCURACY TEST AUDIT.

Louis M. Esposito
Director
DeNovo Global Technologies, Inc

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1.0 INTRODUCTION

DeNovo Global Technologies, Inc. (DeNovo) conducted the Annual RATA Performance Test (RATA) for the South Flare Yokogawa GC 8000 H_2S Gas Chromatograph associated with the WRC operations in Wynnewood, Oklahoma.

The H_2S Annual Performance RATA series consisted of sixteen samples taken within >3 <6 hours for each of the test series.

The subsequent sections of this report present results for the test as follows:

2.0 — Test Methods and Equipment Summary
3.0 — Summary of Test Procedures and Results

The appendices provide documentation and supporting data. The appendices are organized as follows:

Appendix A — Emission Performance RM Calibration and Run Test Data
Appendix B — Operational Data
Appendix C — Gas Calibration Certificates/Support Documentation
Appendix D — Example Calculations
Appendix E — Quality Assurance

2.0 TEST METHODS AND EQUIPMENT SUMMARY

The test program was designed to provide data for documentation of compliance with federal regulations associated with NSPS Subparts and state operating permit requirements related to certification of unit emissions. Specifically, testing for the WRC facility consisted of sampling the South Flare Yokogawa GC 8000 Gas Chromatograph for H_2S. The following is a brief description of the units:

South Flare H_2S CEMS:

H_2S Analyzer – Yokogawa Gas Chromatograph
Model: GC8000
Serial No: KGC – KGC11728
Span Range- 0 – 300 ppm H_2S
Plant I.D No.: 1003885
Range: 300 ppm

The Plant Data Acquisition System (DAS) is managed by a Total Distributive Control (TDC) processor which compiles process data points from the units into the Plant History Database (PHD). The PHD system provides one minute averaged data.

3.0 SUMMARY OF TEST PROCEDURES AND RESULTS

A summary of the RATA test series is given in Table 3-1 below.

3.1 South Flare Emission Performance Test

RATA testing was performed on November 29, 2016 on the South Flare Yokogawa GC 8000 H_2S Gas Chromatographs. A minimum of sixteen (16) test runs were used from sample bag injections for the unit test series. Testing was performed in accordance with EPA Method15 (modified), gas chromatography sampling and analytical test procedures to calculate the average for the RA determination for the unit. The RM average was then compared with the CEM averages to determine the analyzer relative accuracy. The RA Performance Specification for H_2S analyzer specifies the CEMS to be within 20% of the reference method, or 10% of the emission standard (162 ppm).

Based on the test results, the South Flare Yokogawa GC 8000 H_2S Gas Chromatograph Passed the Annual RATA certification.

3.2 Sampling and Analytical Procedures

3.2.1 RM - Gas Chromatography Instrumentation

The compound to be analyzed for was hydrogen sulfide (H_2S). The instrument used for the analyses was a SRI 8610C equipped with a flame photometric detector (FPD). The detector temperature was set at 125^{0}C, and a sample flow of 70 ml per minute. Column temperature was set at 45^{0}C. A 1.0 - milliliter sample loop mounted on an automatic sampling valve was used to inject both calibration and sample gases on to two Chromasil 310 3-meter x 1/8" packed Teflon columns configured in series.

3.2.2 GC Calibration Procedure

The GC was calibrated using $H_2S/COS/CS_2$ certified gas. A 7-point curve was obtained by diluting the standard with nitrogen gas to 100% and 50% of a 488.2 ppm gas standard and also diluting the standard with nitrogen gas to 100%, 50%, 25%, 12.5% and 0% of the 154.7 ppm gas standard concentration. The dilutions were accomplished within the precision syringe by taking in a specified amount of standard and then diluting with the nitrogen. Runs were done at each calibration point until three consecutive runs were within 10% of each other with the final analysis point being added to the curve. Certified H_2S standards within the range of the facility operating conditions were injected to confirm calibration.

3.2.3 GC Sampling Procedure

The flare gas samples measured by the Yokogawa GC 8000 H_2S Gas Chromatographs were sampled and measured according to the requirements and procedures of EPA Reference Method 15 with the following two modifications. Gas samples were collected in Tedlar bags instead of direct injection and the GC was calibrated by means of certified gas standards versus permeation tubes. Each Tedlar bag was purged with nitrogen prior to use and then filled directly from the Yokogawa fuel gas analyzer sample port feed tap. The sample port taps were fitted with 1/4" stainless swag-lok fittings and connected to Teflon tubing. The sample line was purged prior to each sample. The labeled tedlar bags were then immediately brought to the RM GC for immediate analysis via direct injection. No dilutions of the sample were necessary since the established calibration table covered the appropriate range.

3.2.4 GC Data Collection and Integration

The results were integrated using Peak Simple GC software, with data analysis specific to H_2S concentrations reported in parts per million (ppm)

Table 3-1: South Flare Yokogawa GC 8000 H2S CEMS Rata

Run No.	RM H_2S (ppm)	CEMS H_2S (ppm)
1.	67.60	63.31
2.	68.85	62.74
3.	71.70	65.02
4.	70.55	62.97
5.	68.86	63.21
6.	70.67	62.17
7.	68.92	62.07
8.	67.35	65.71
9.	62.35	63.56
10.	65.09	63.46
11.	66.73	62.52
12.	66.94	61.84
13.	66.98	62.06
14.	65.77	62.07
15.	67.81	63.20
16.	64.24	64.33
Avg	67.53	63.14
Mean Difference	4.3856	
StdDe	2.7187	
ConC.	1.4484	
RA%	8.6	
Ac/Std %	3.6	
Status	PASS	

H_2S shall not exceed 20.0 percent of the mean value of the reference method test data or 10 percent of the Relative Standard, whichever is greater

APPENDIX A - South Flare Yokogawa GC 8000 H_2S Test Data

DeNovo Global Technologies, Inc. *ENVIRONMENTAL ENGINEERING AND TESTING SERVICES*

17902 East Strack Drive
Spring, TX 77379

Phone: 281-251-0399
Fax: 281-251-1301

CLIENT:	CVR Energy	DATE:	11/29/2016
LOCATION:	Wynnewood, Oklahoma	PROJECT NO.:	5281.03.05
LOAD:	N/A	PERSONNEL:	Louis Esposito
ANALYZER:	Yokogawa GC8000	SOURCE:	South Flare
I.D.:	KGC-11728	APPLICABLE STANDARD:	162

RELATIVE ACCURACY TESTING SUMMARY - South Flare H2S ANALYZER

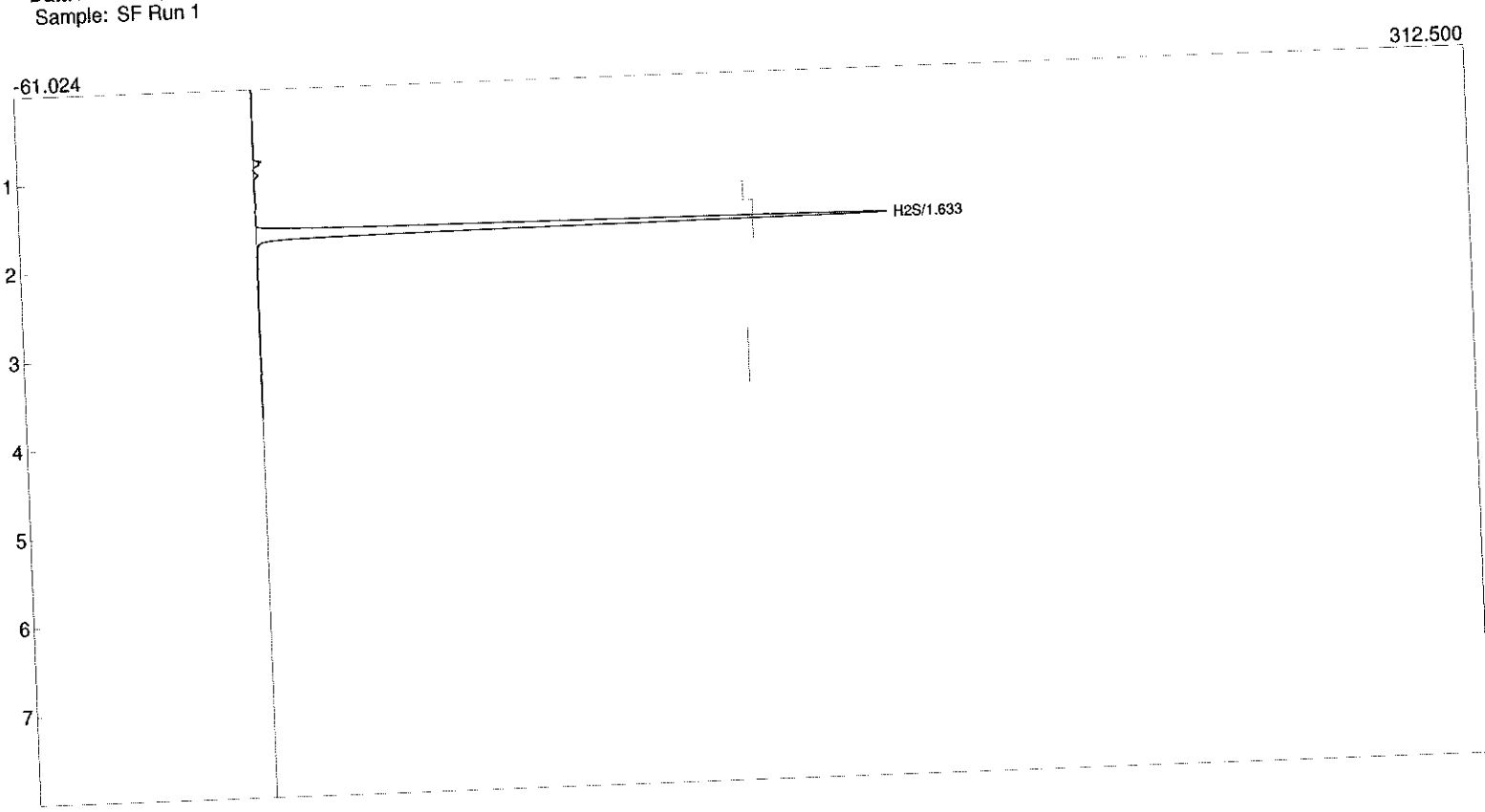
The table below contains the results of testing and calcultions performed on the date(s) listed.
The testing was performed in accordance with 40 CFR Part 60, Appendix B, Performance Specification 7

South Flare			
TIME	RM	CEMS	Dif
9:28	67.60	63.31	4.29
9:41	68.85	62.74	6.11
9:54	71.70	65.02	6.68
10:07	70.55	62.97	7.58
10:20	68.86	63.21	5.65
10:38	70.67	62.17	8.50
11:49	68.92	62.07	6.85
12:10	67.35	65.71	1.64
12:28	62.35	63.56	-1.21
12:44	65.09	63.46	1.63
12:58	66.73	62.52	4.21
13:16	66.94	61.84	5.10
13:54	66.98	62.06	4.92
14:05	65.77	62.07	3.70
14:19	67.81	63.20	4.61
14:32	64.24	64.33	-0.09
Average	**67.53**	**63.14**	**4.39**

RM AVERAGE:	67.5256	ppmv
CEMS AVERAGE:	63.1400	ppmv
ARITHMETIC MEAN:	4.3856	
STANDARD DEVIATION:	2.7187	
CONFIDENCE COEFFICIENT:	1.4484	
ACCURACY VS. RM AVERAGE:	**8.6**	%
ACCURACY VS. APPLICABLE STANDARD:	**3.6**	%

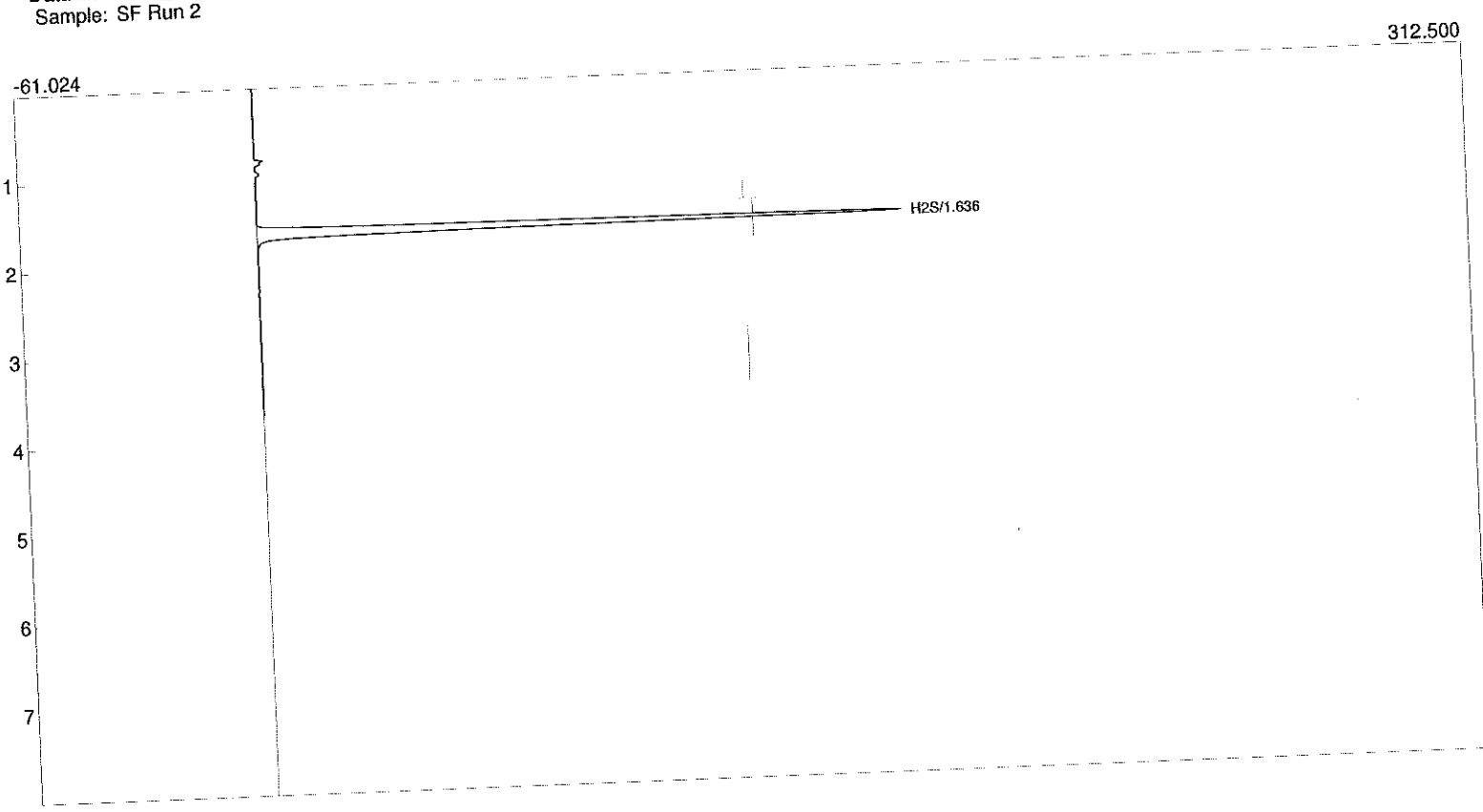
THE ABOVE DATA CERTIFIES THAT THE C.E.M. FOR WHICH THIS DATA IS
PROVIDED PASSES ___X___, FAILS _____ THE RELATIVE ACCURACY TEST

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_12.CHR ()
Sample: SF Run 1



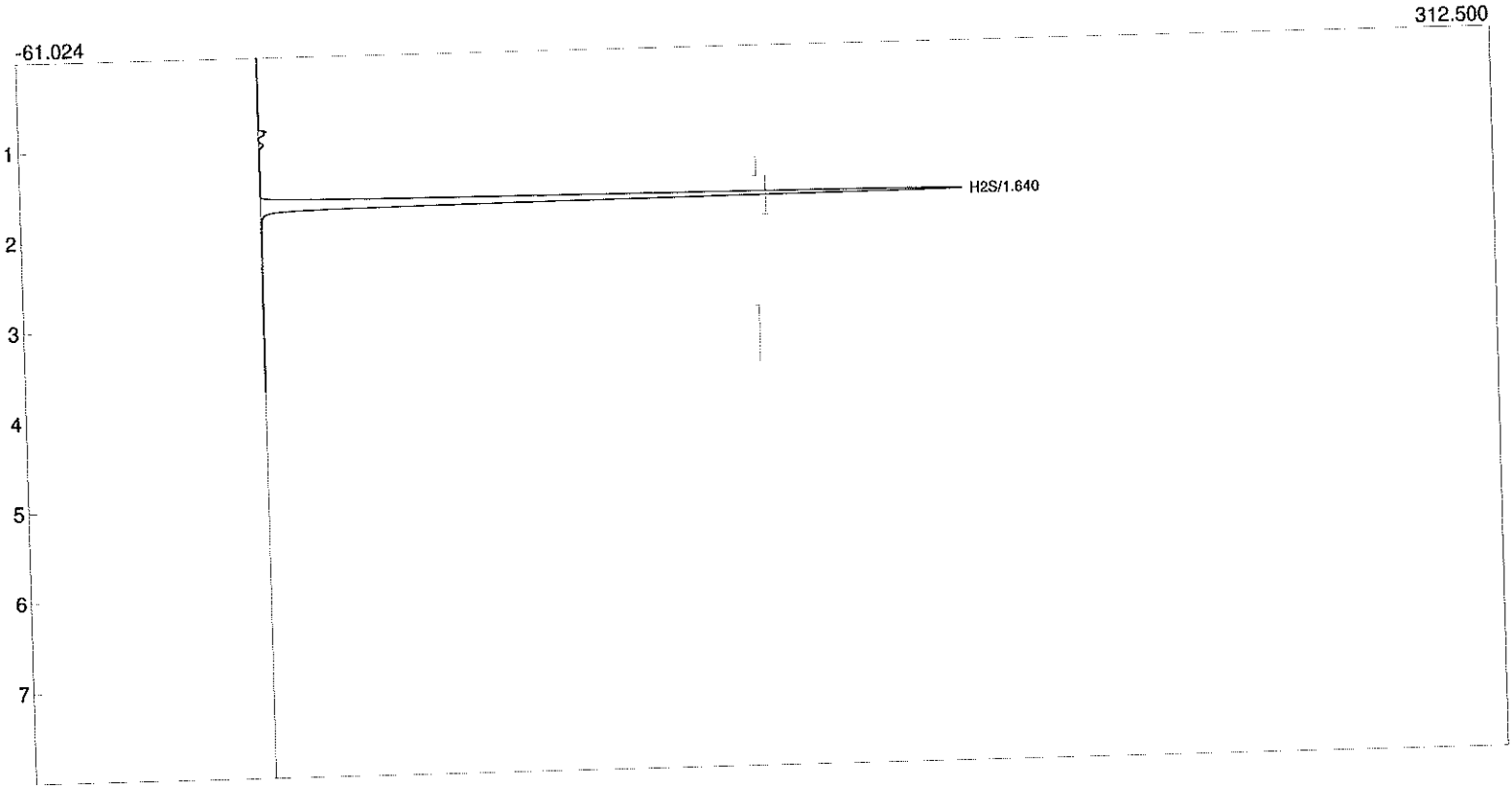
Component	Retention	External	Units
H2S	1.633	67.6670	
		67.6670	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_13.CHR ()
Sample: SF Run 2



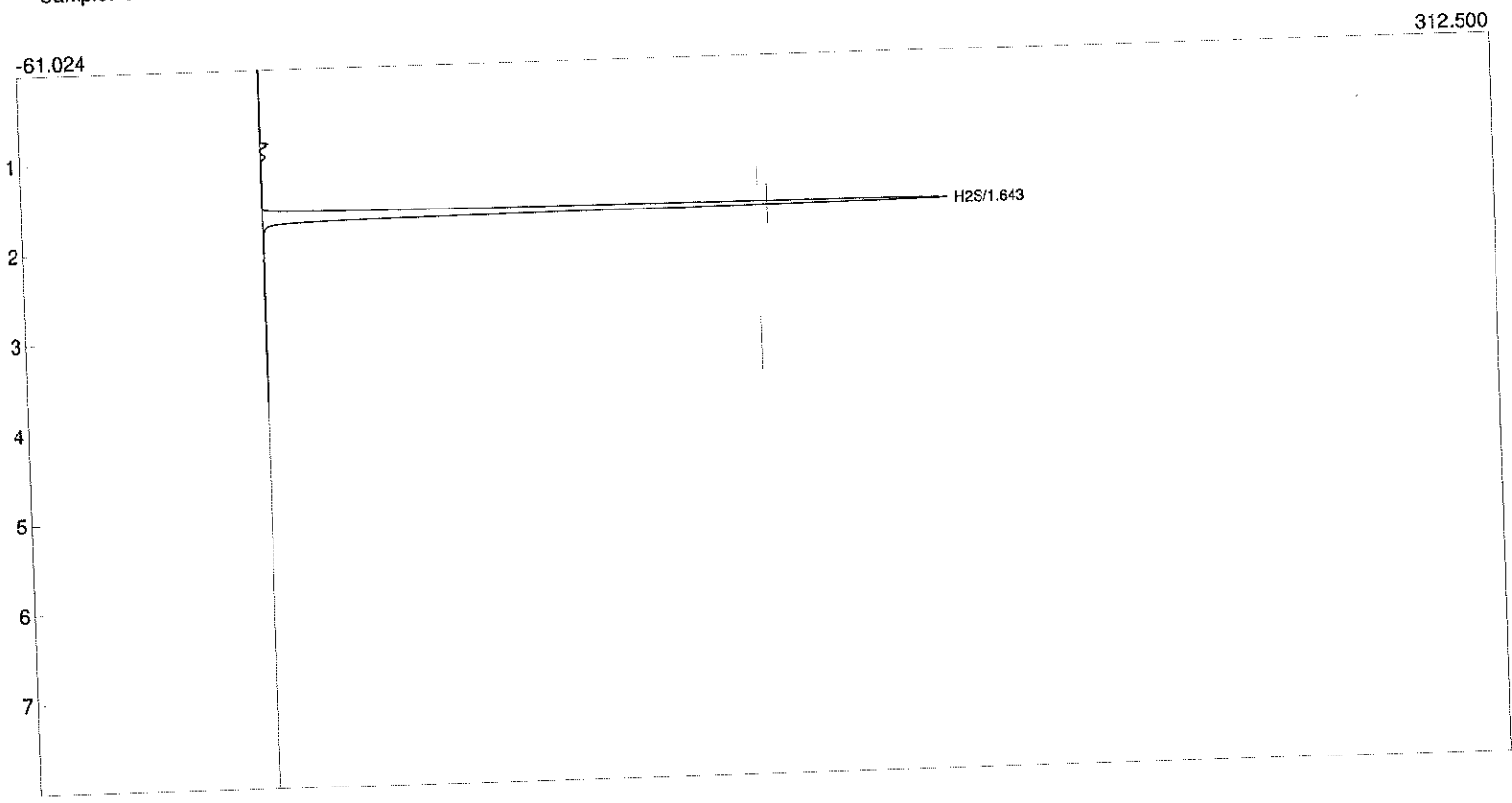
Component	Retention	External	Units
H2S	1.636	68.8581	
		68.8581	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_14.CHR ()
Sample: SF Run 3



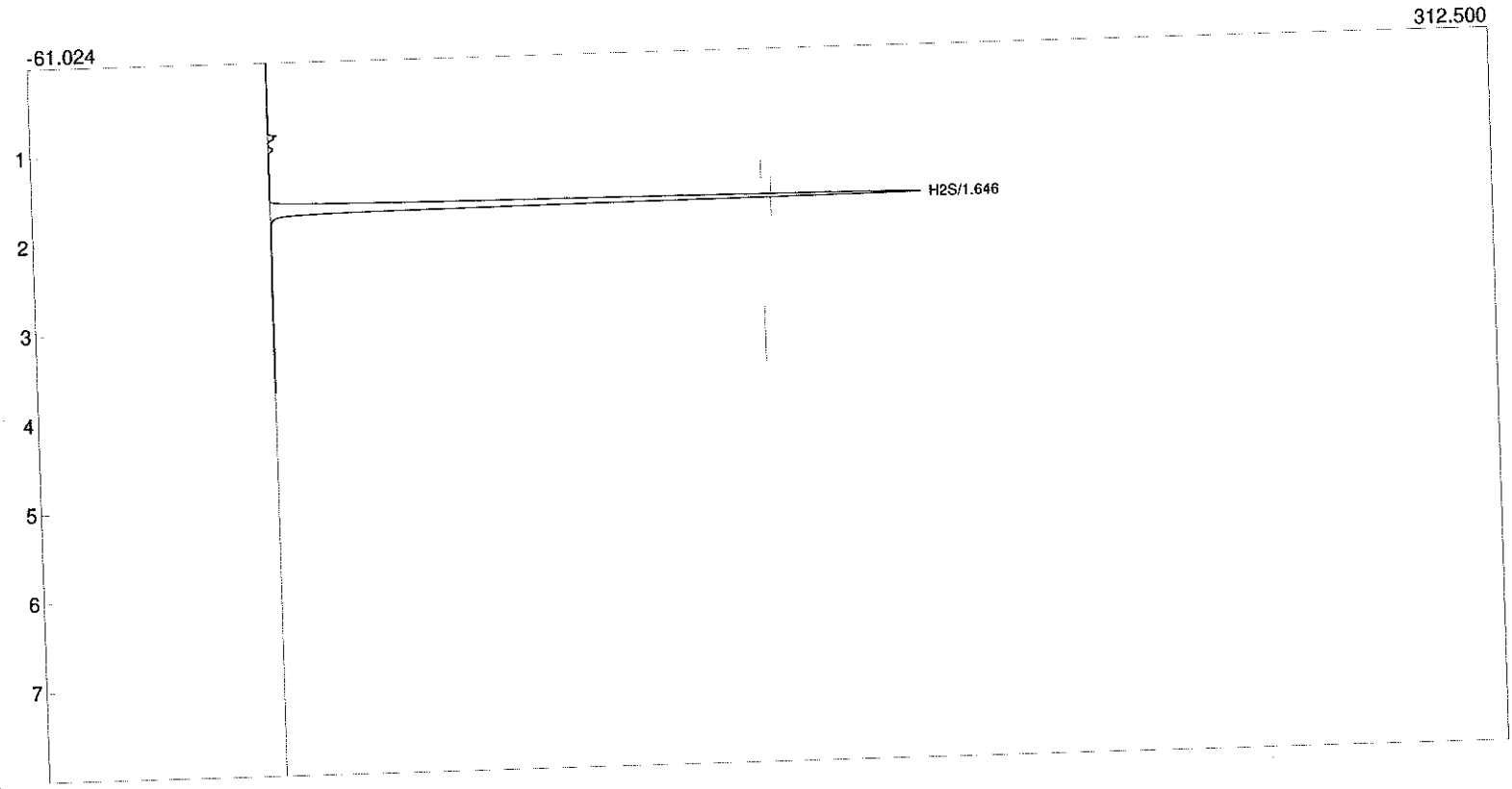
Component	Retention	External	Units
H2S	1.640	71.7631	
		71.7631	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_15.CHR ()
Sample: SF Run 4



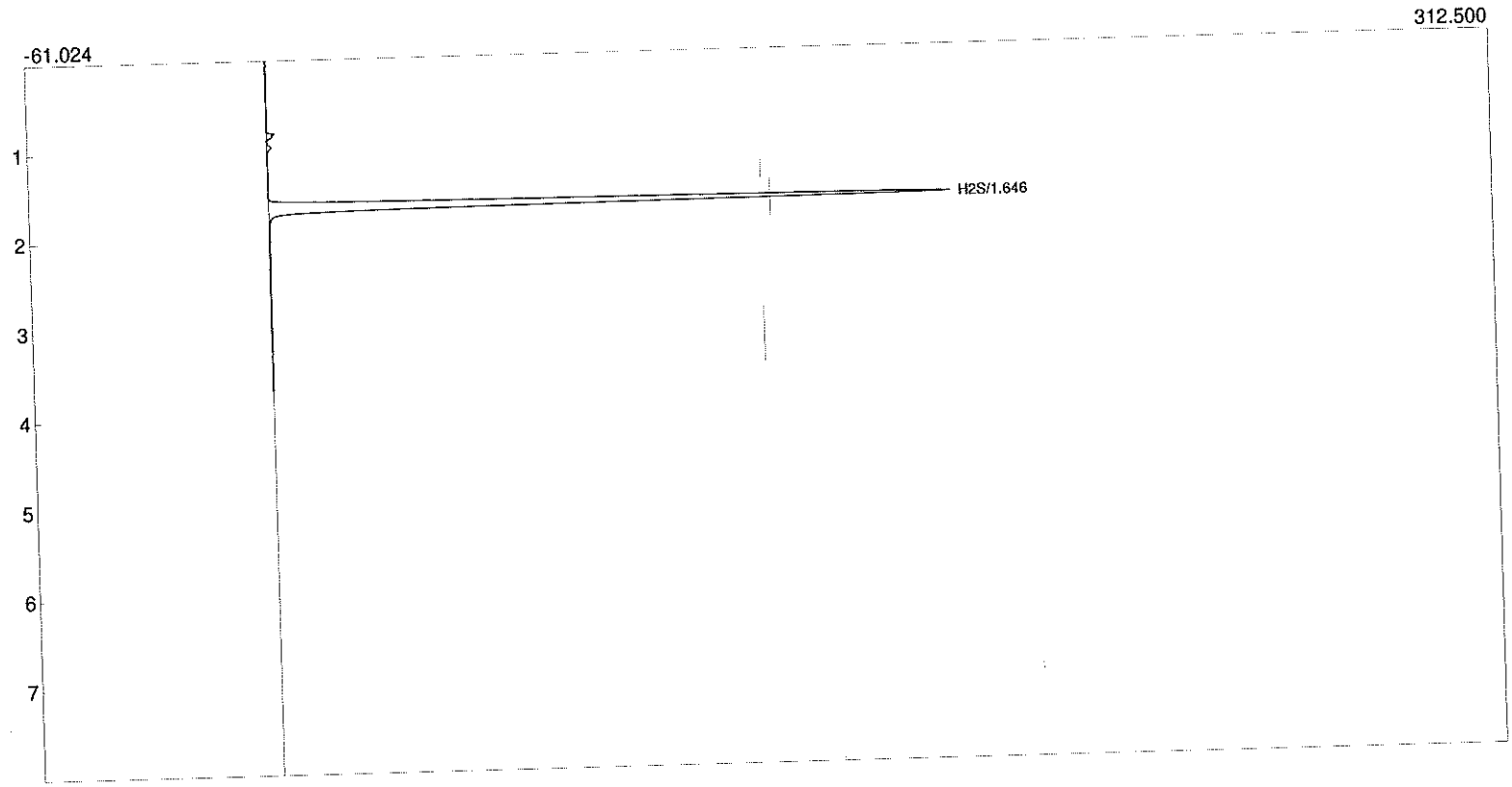
Component	Retention	External	Units
H2S	1.643	70.5560	
		70.5560	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_16.CHR ()
Sample: SF Run 5



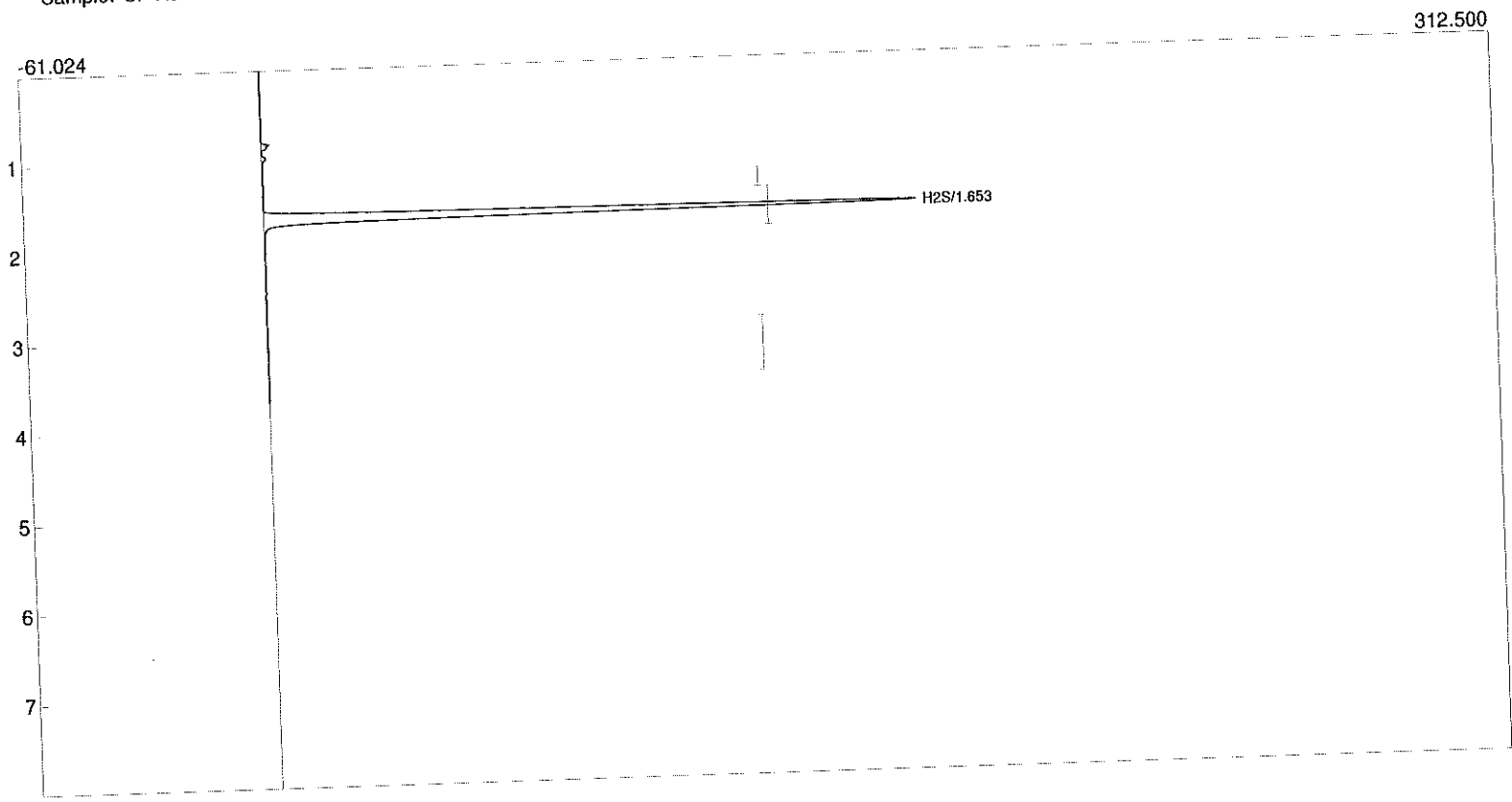
Component	Retention	External	Units
H2S	1.646	68.8606	
		68.8606	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_17.CHR ()
Sample: SF Run 6



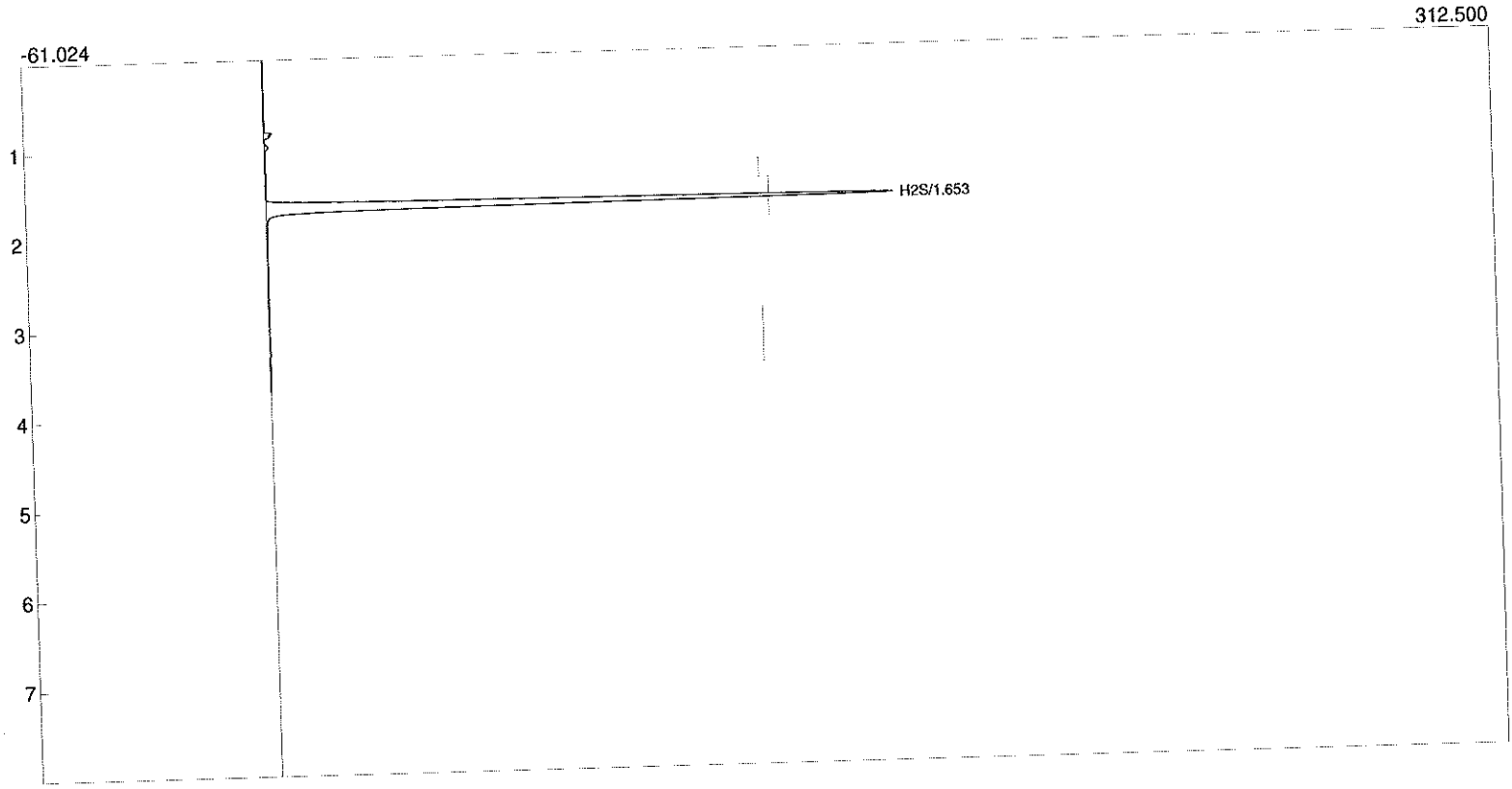
Component	Retention	External	Units
H2S	1.646	70.6778	
		70.6778	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_18.CHR ()
Sample: SF Run 7



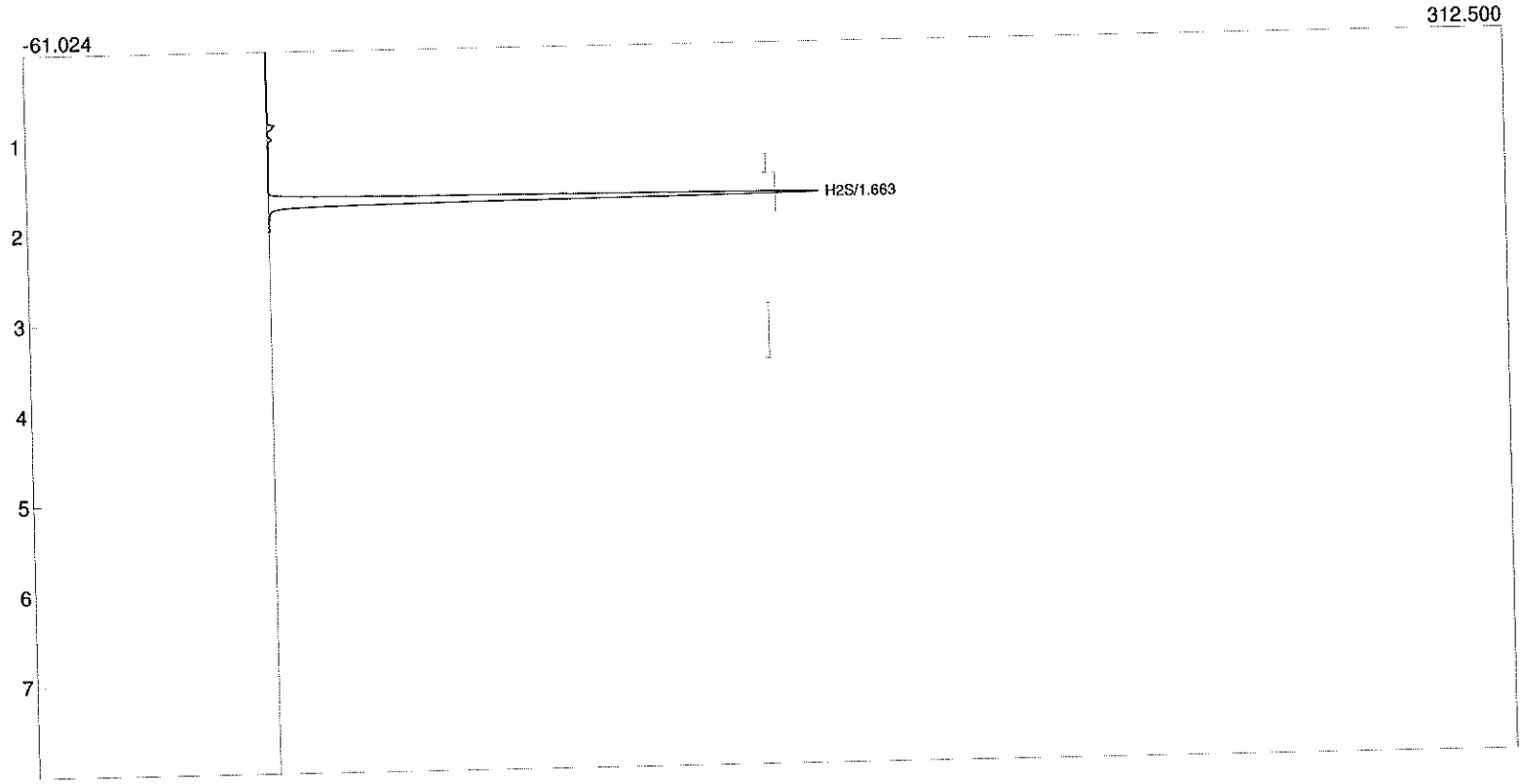
Component	Retention	External	Units
H2S	1.653	68.9230	
		68.9230	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_19.CHR ()
Sample: SF Run 8



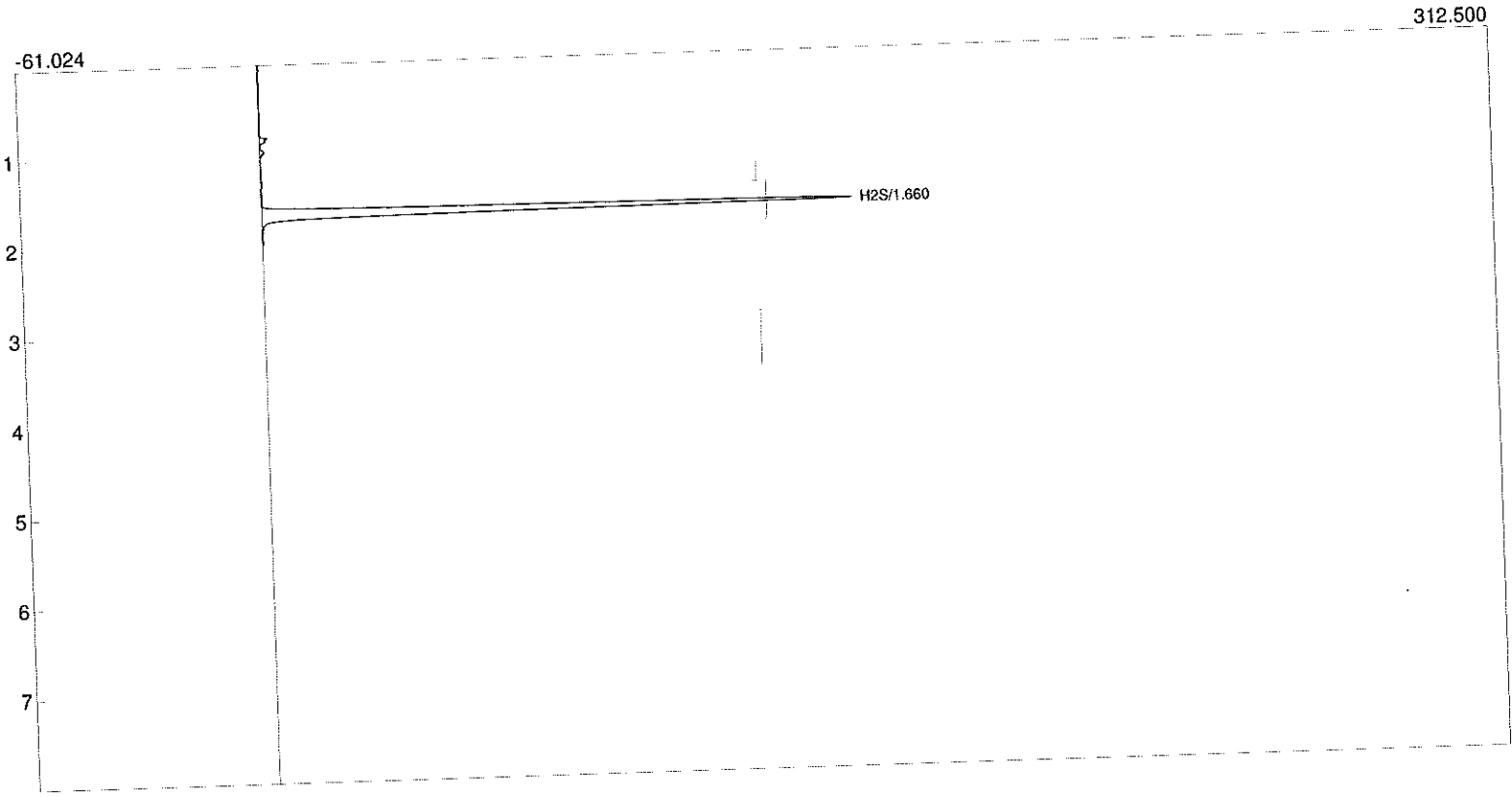
Component	Retention	External	Units
H2S	1.653	67.3450	
		67.3450	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
ontrol filename: C:\peak444-64bit\H2swynn.con
Data file: 5281_305_31.CHR ()



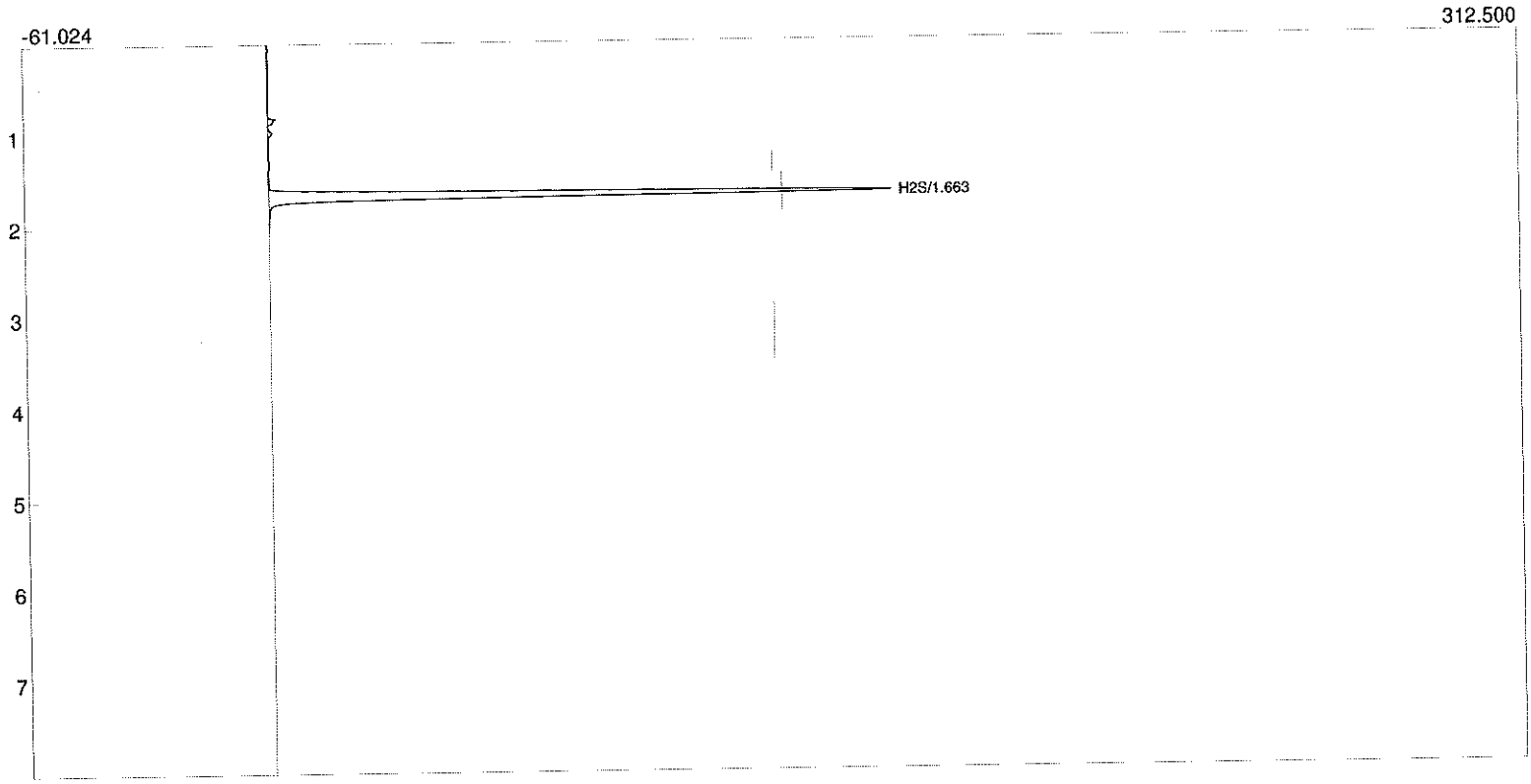
Component	Retention	External	Units
H2S	1.663	62.3520	
		62.3520	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
ontrol filename: C:\peak444-64bit\H2swynn.con
Data file: 5281_305_32.CHR ()



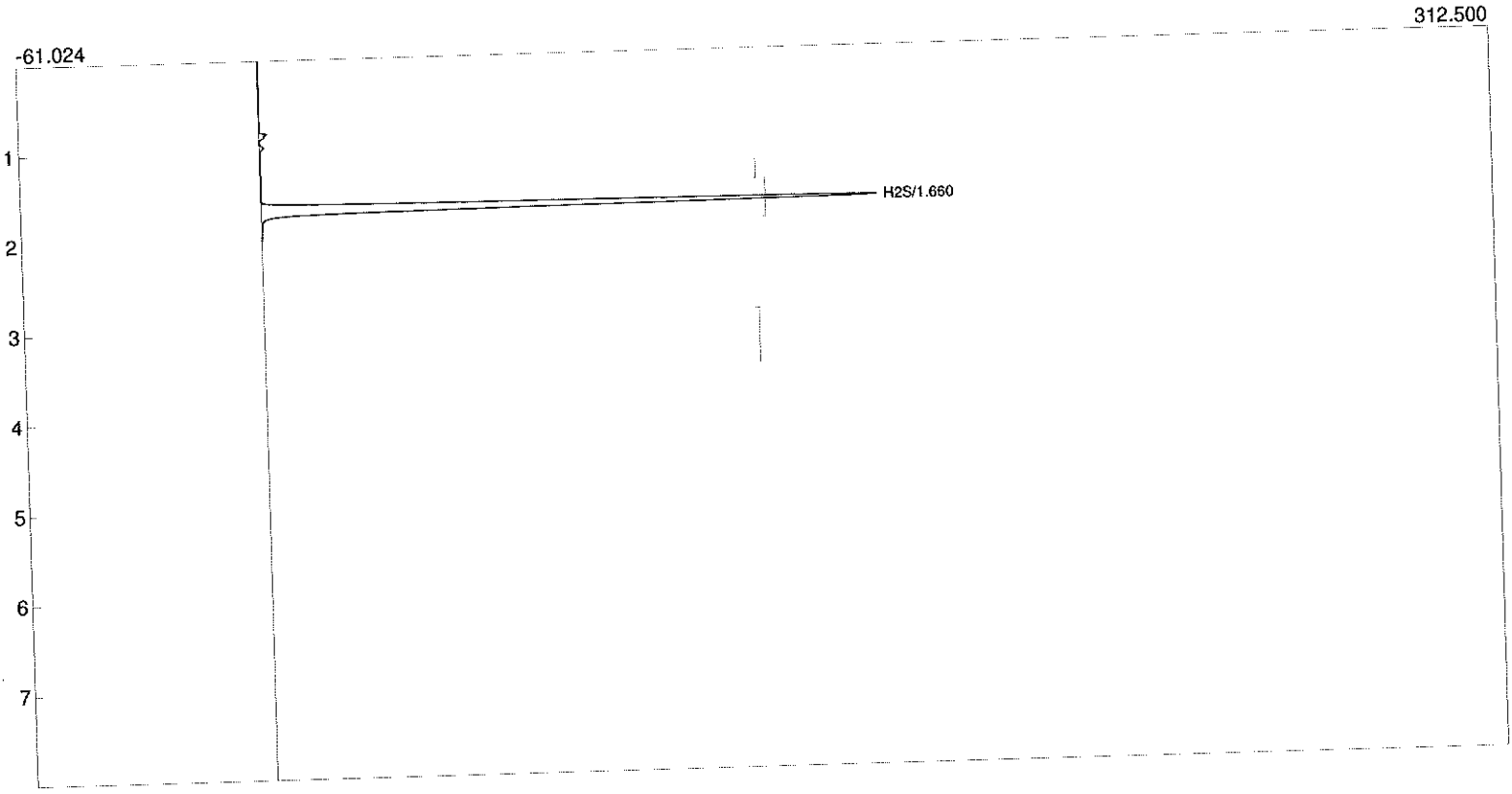
Component	Retention	External	Units
H2S	1.660	65.0989	
		65.0989	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
ontrol filename: C:\peak444-64bit\H2swynn.con
Data file: 5281_305_33.CHR ()



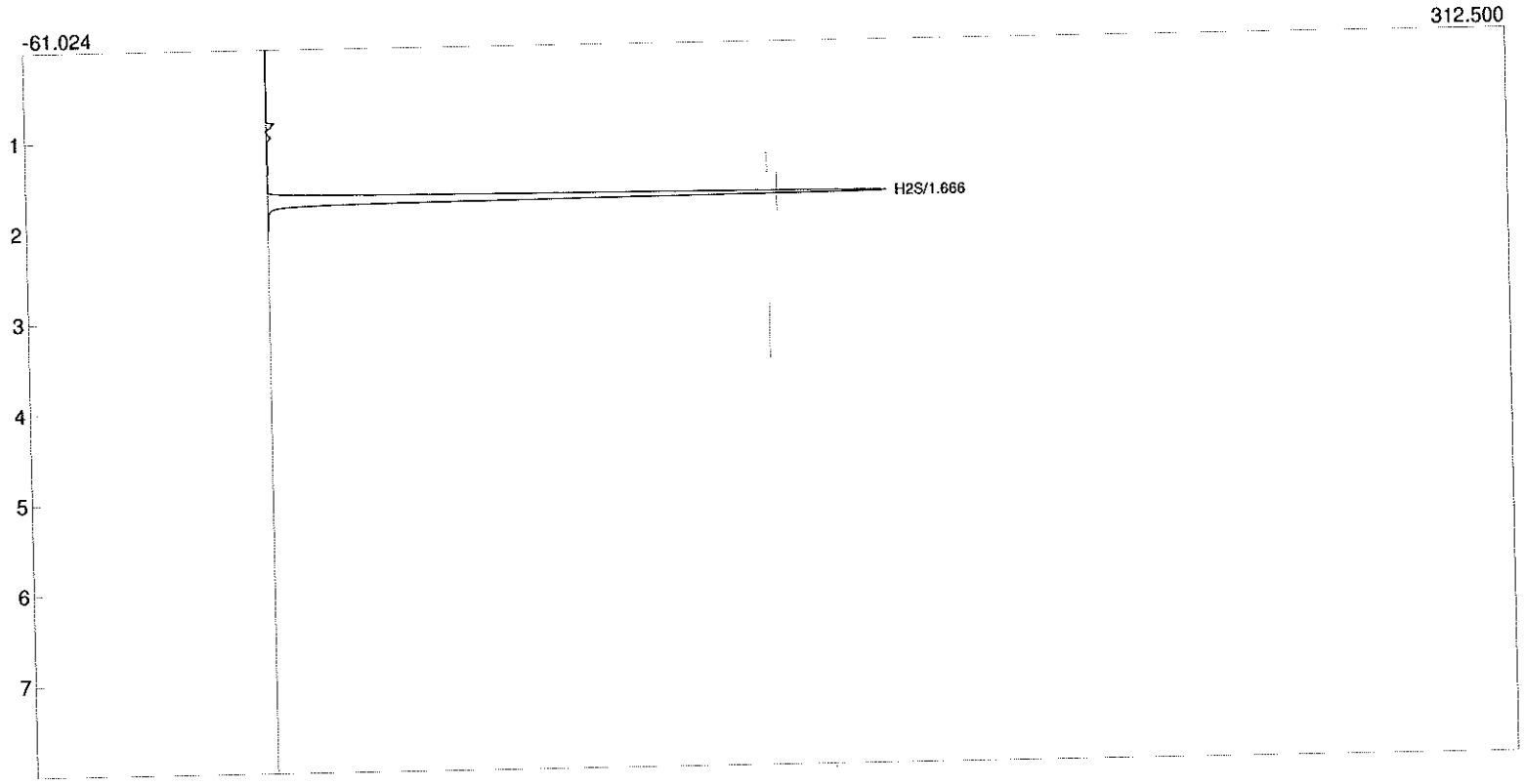
Component	Retention	External	Units
H2S	1.663	66.7334	
		66.7334	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
ontrol filename: C:\peak444-64bit\H2swynn.con
Data file: 5281_305_34.CHR ()



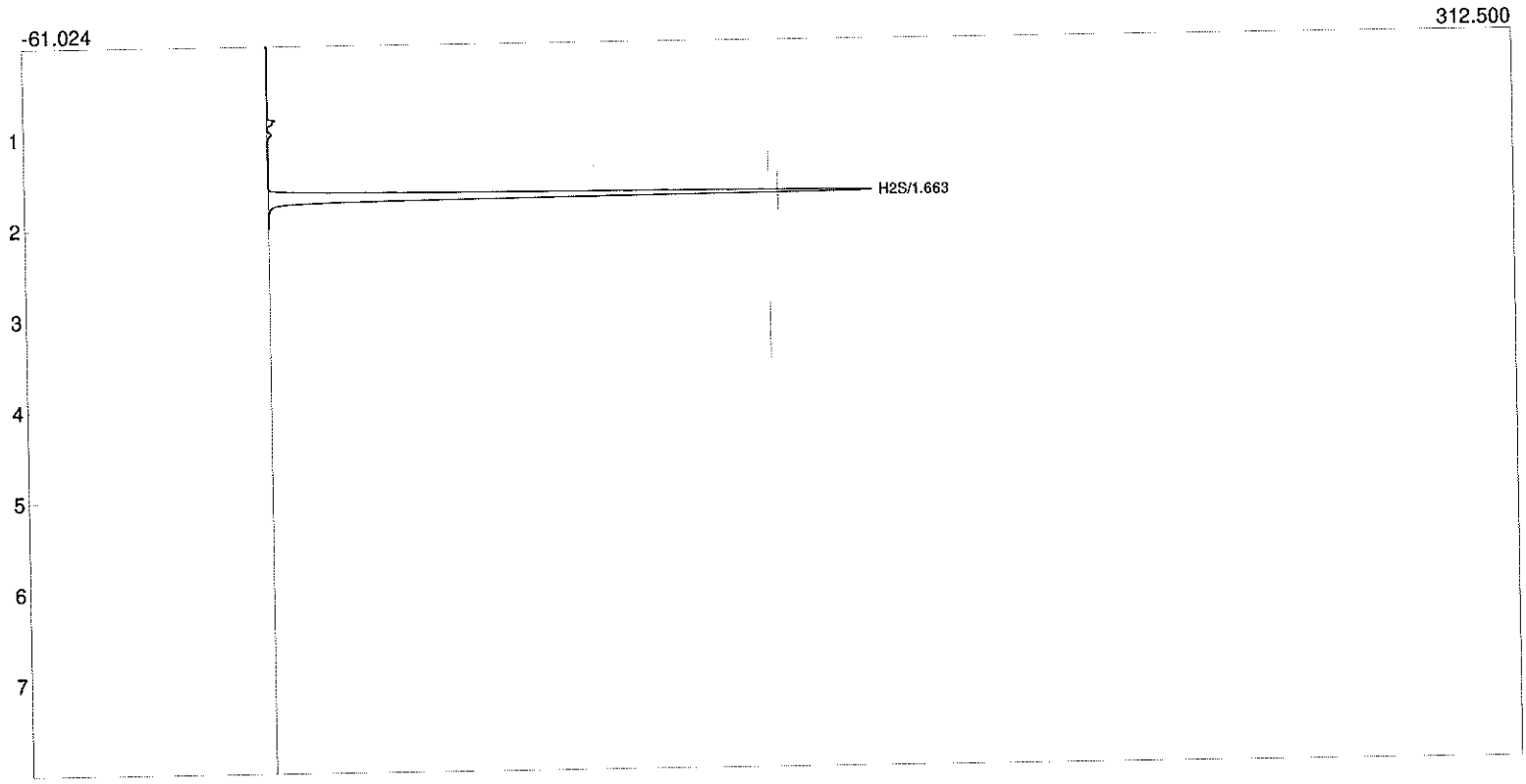
Component	Retention	External	Units
H2S	1.660	66.9403	
		66.9403	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
ontrol filename: C:\peak444-64bit\H2swynn.con
Data file: 5281_305_35.CHR ()



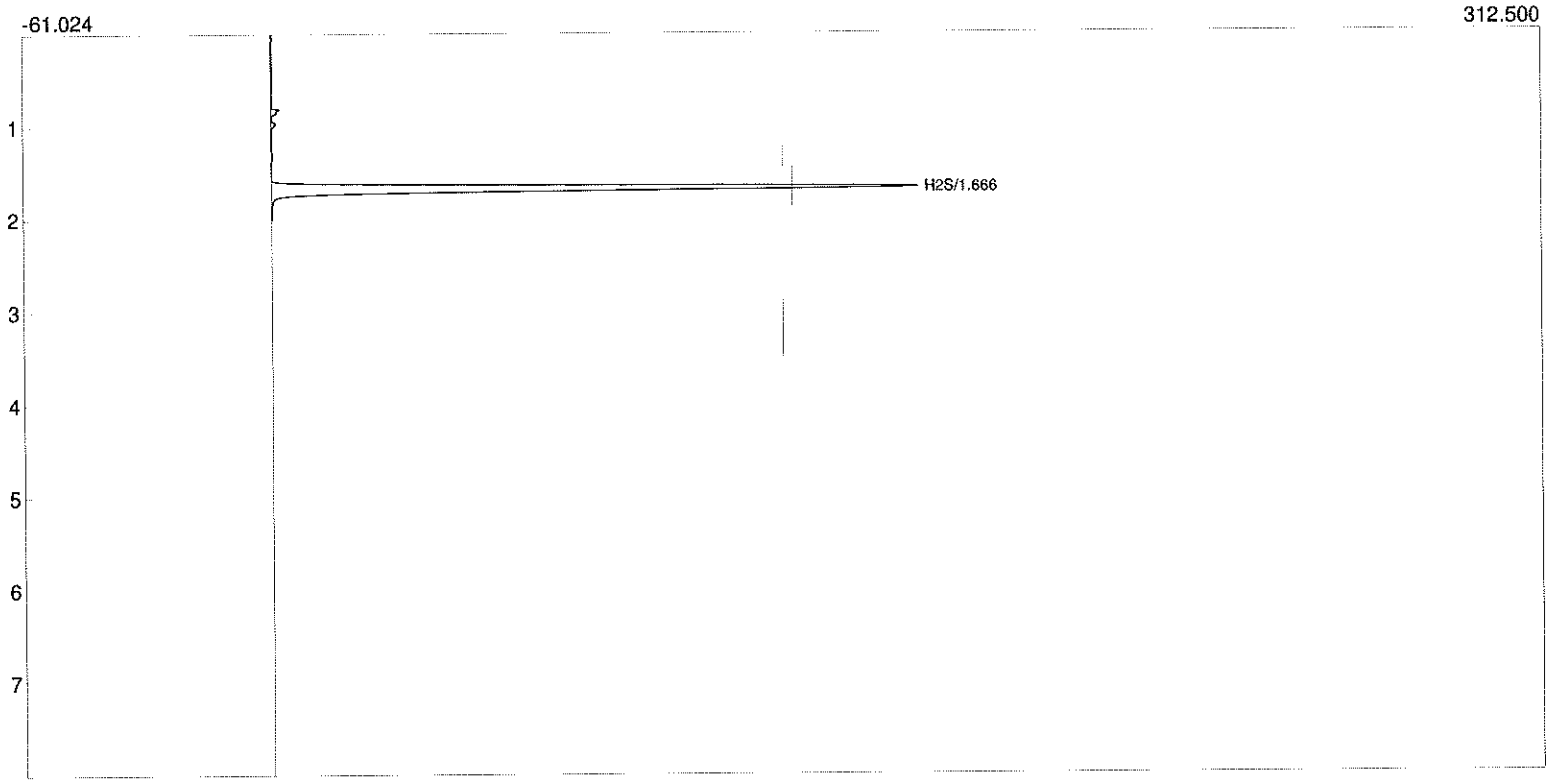
Component	Retention	External	Units
H2S	1.666	66.9869	
		66.9869	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
ontrol filename: C:\peak444-64bit\H2swynn.con
Data file: 5281_305_36.CHR ()



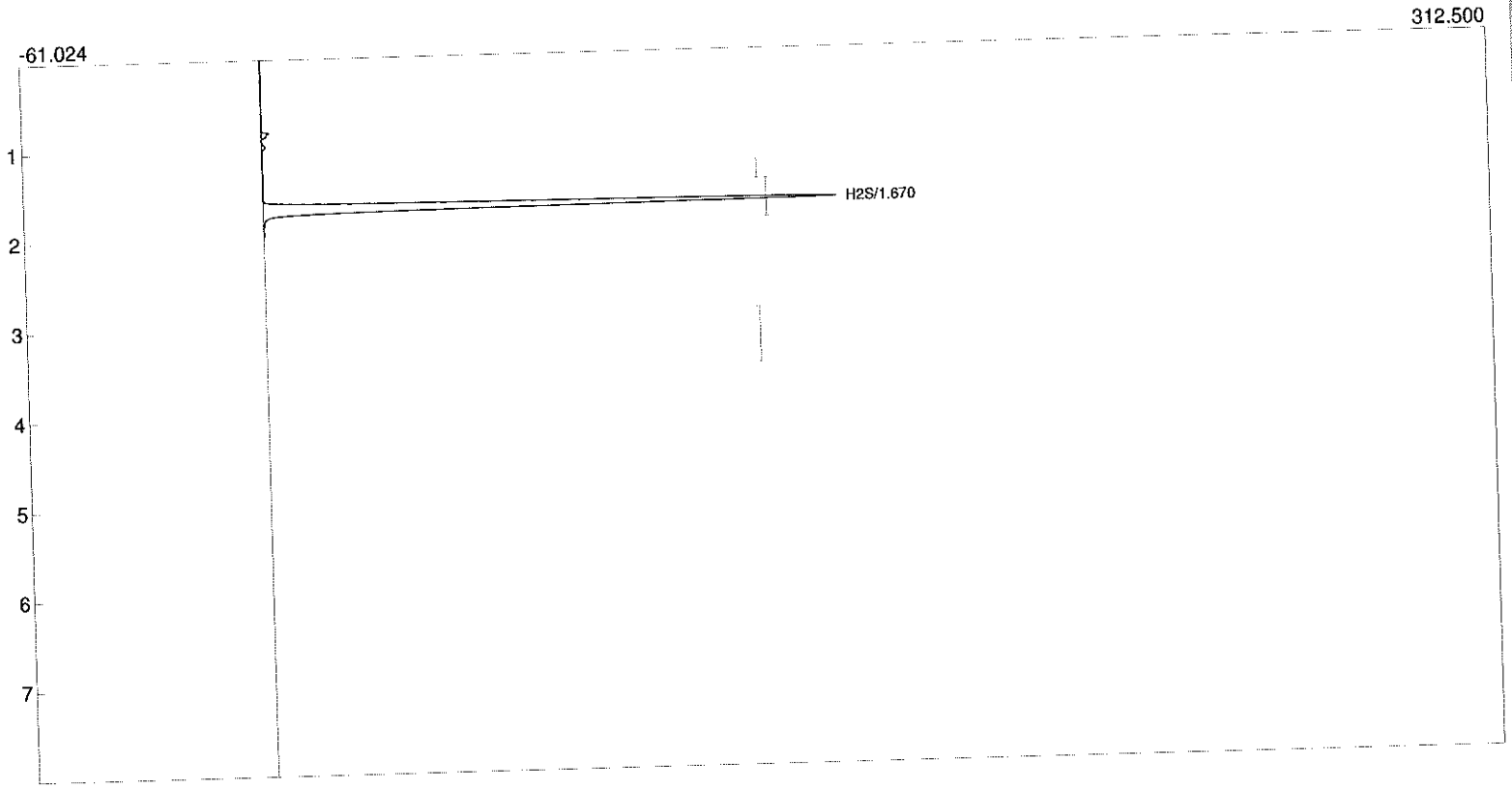
Component	Retention	External	Units
H2S	1.663	65.7757	
		65.7757	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
ontrol filename: C:\peak444-64bit\H2swynn.con
Data file: 5281_305_37.CHR ()



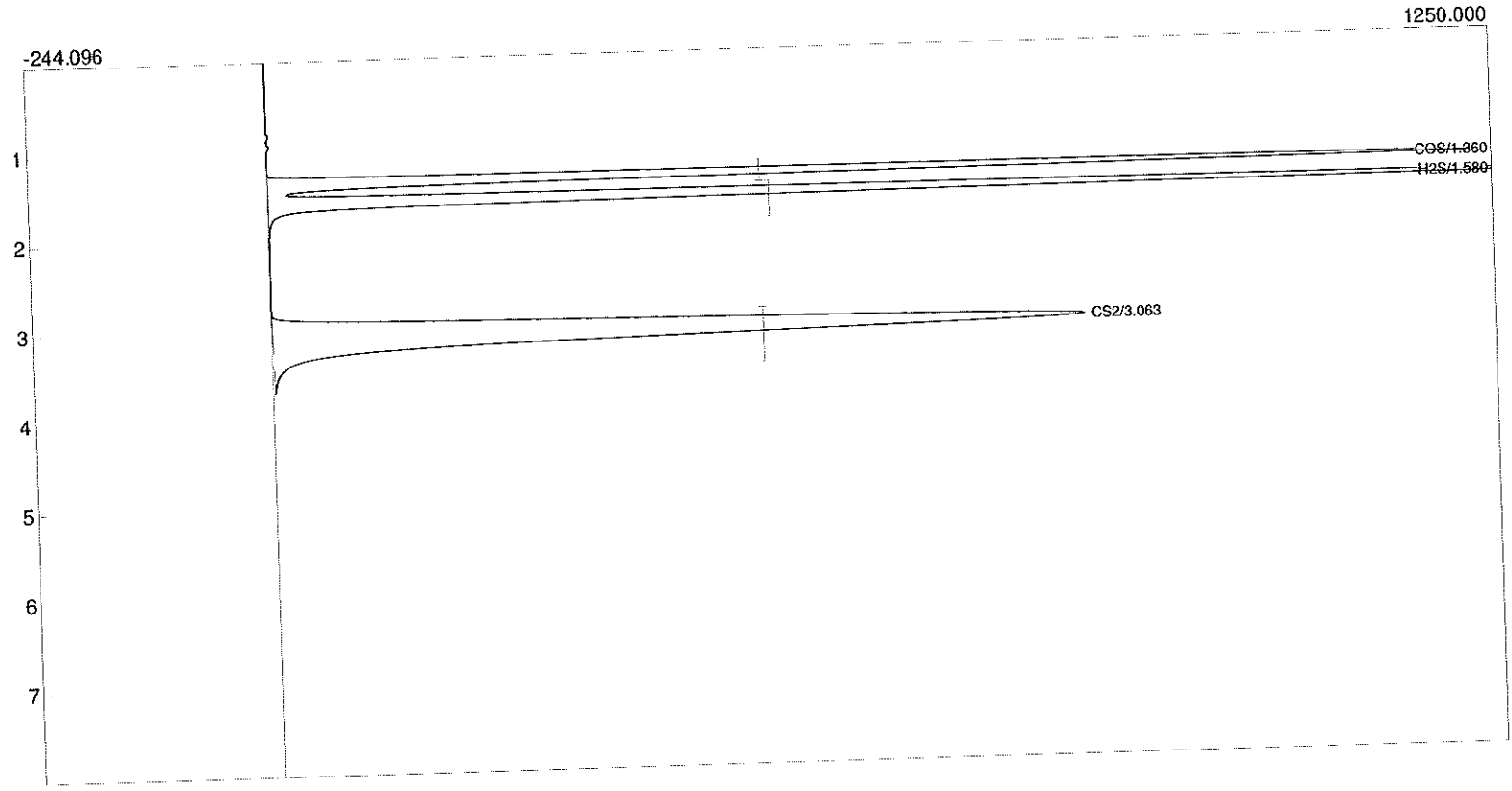
Component	Retention	External	Units
H2S	1.666	67.8151	
		67.8151	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
ontrol filename: C:\peak444-64bit\H2swynn.con
Data file: 5281_305_38.CHR ()



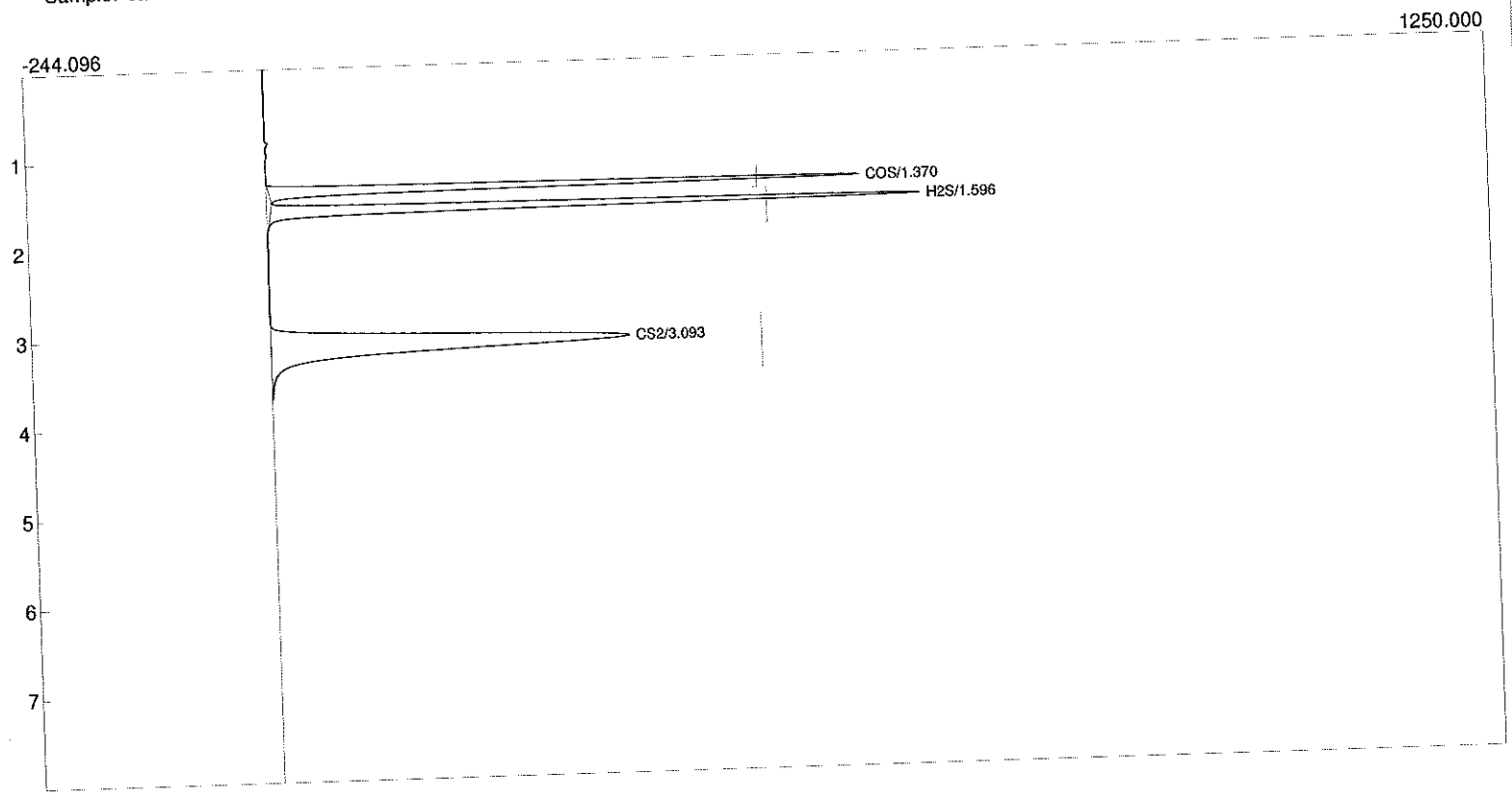
Component	Retention	External	Units
H2S	1.670	64.2420	
		64.2420	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_01.CHR ()
Sample: cal 488



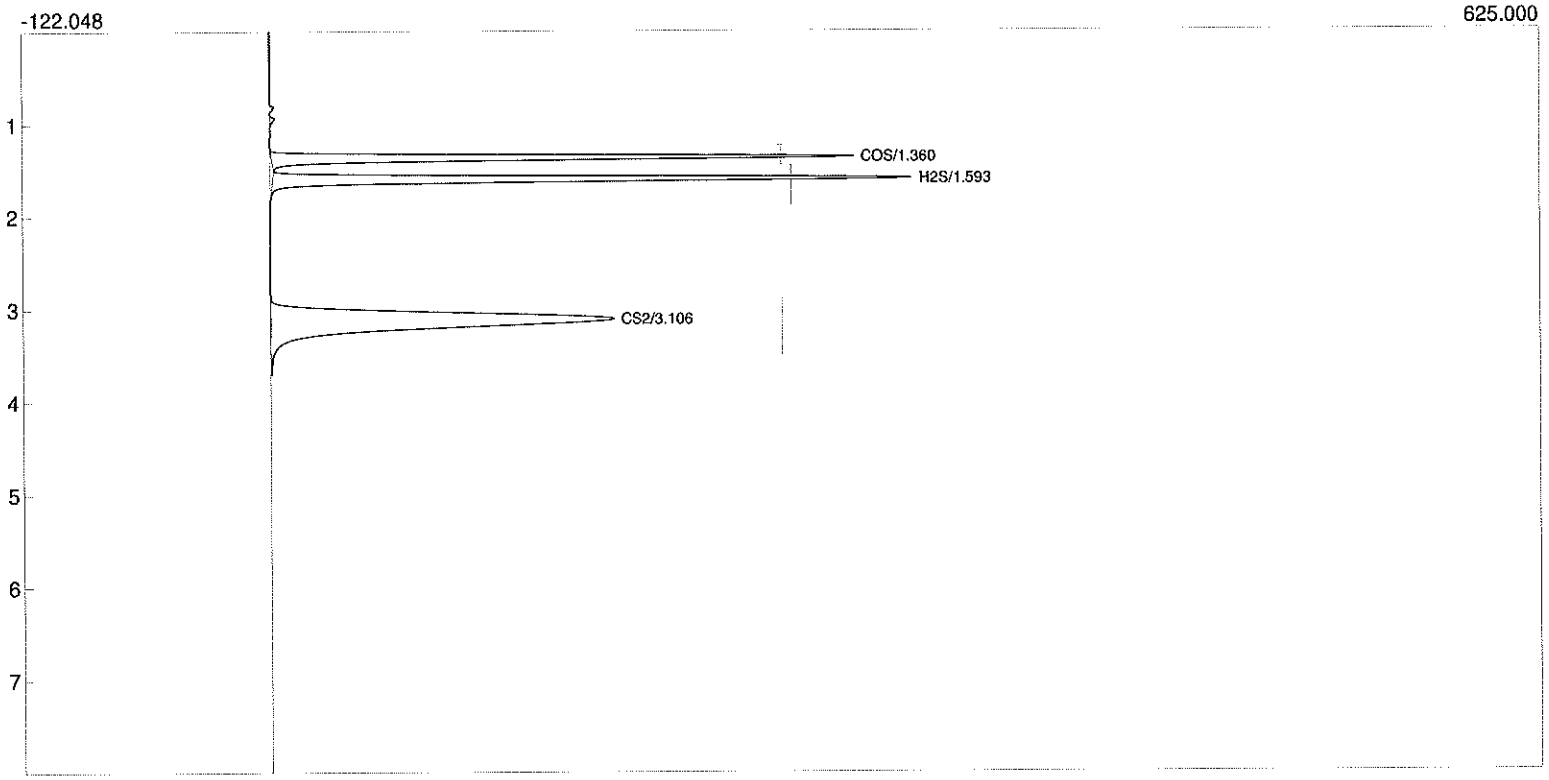
Component	Retention	External	Units
COS	1.360	481.1534	
H2S	1.580	488.1923	
CS2	3.063	509.4956	
		1478.8413	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_02.CHR ()
Sample: cal 244



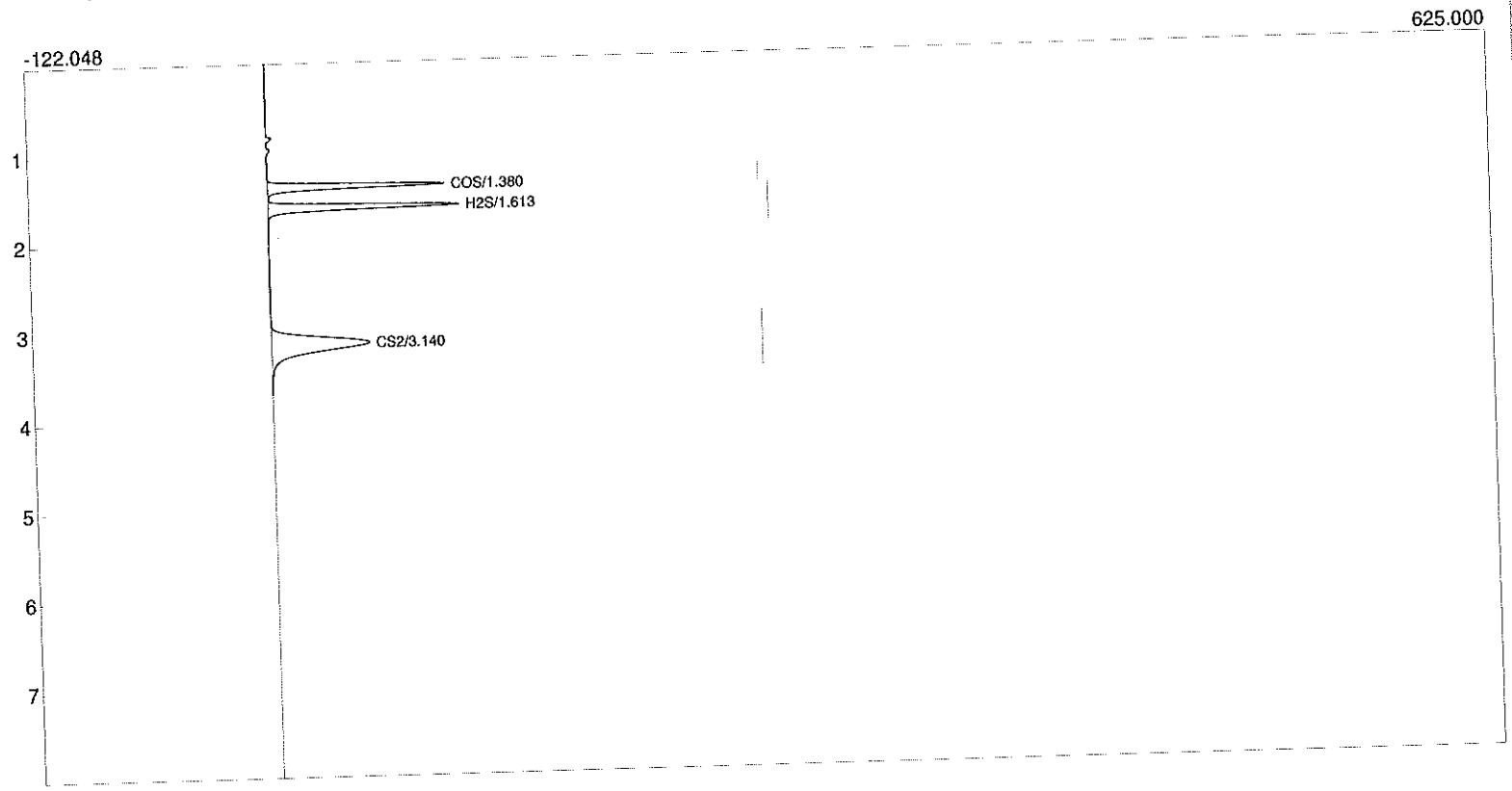
Component	Retention	External	Units
COS	1.370	240.6243	
H2S	1.596	244.0275	
CS2	3.093	254.7931	
		739.4450	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_03.CHR ()
Sample: cal 157



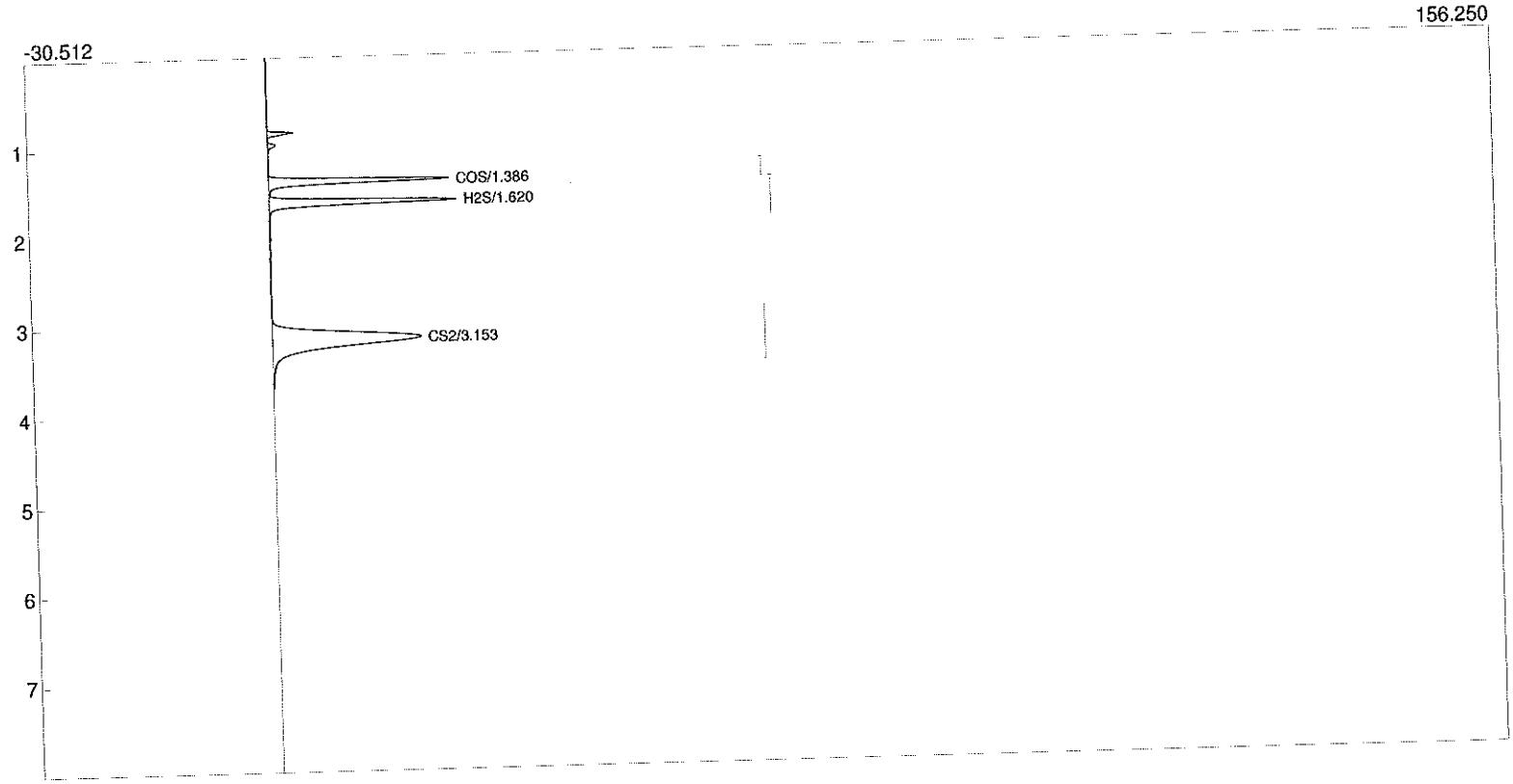
Component	Retention	External	Units
COS	1.360	157.4060	
H2S	1.593	154.6374	
CS2	3.106	161.3844	
		473.4277	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_04.CHR ()
Sample: cal 78



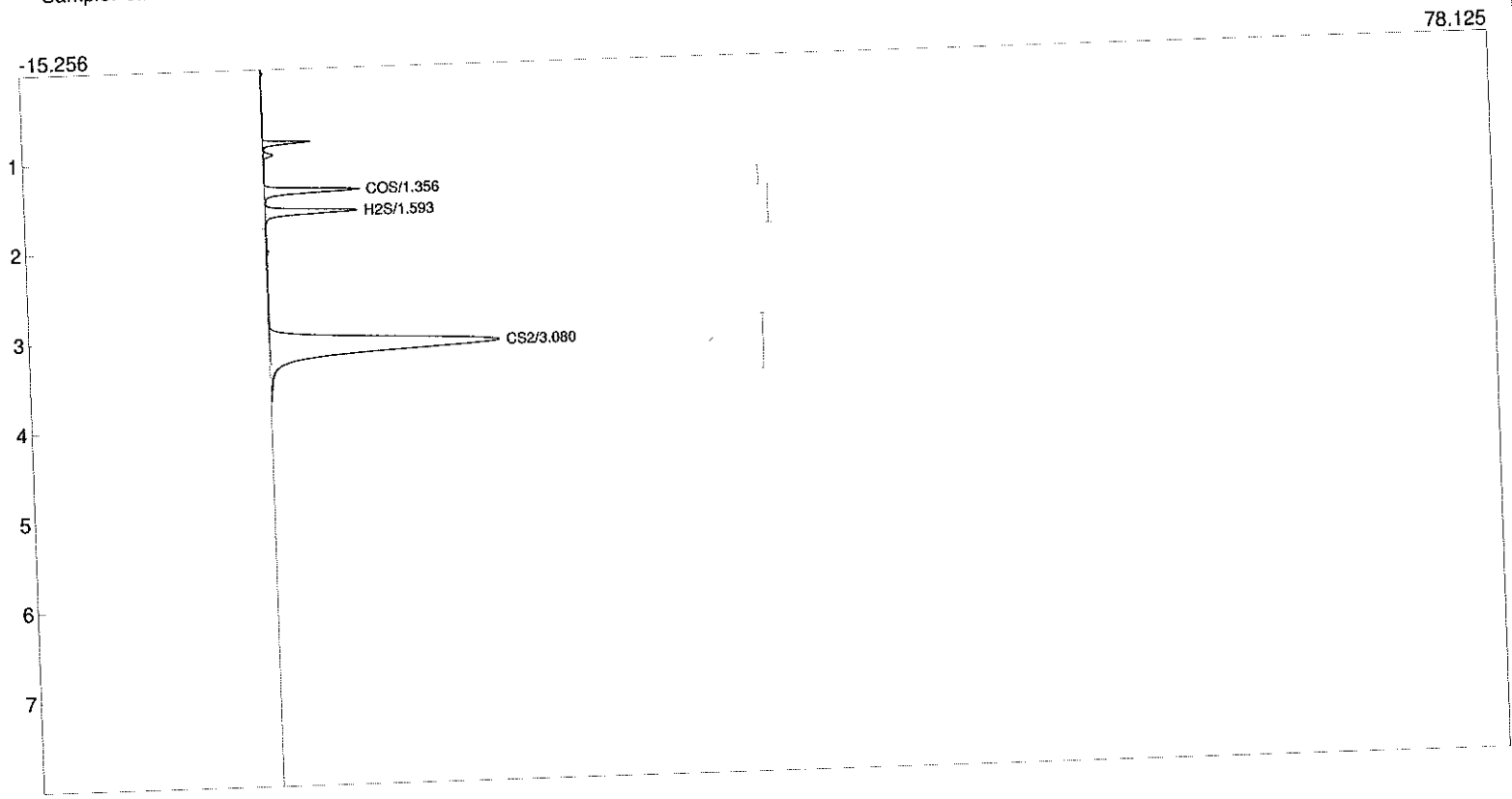
Component	Retention	External	Units
COS	1.380	78.7072	
H2S	1.613	77.3724	
CS2	3.140	80.7075	
		236.7871	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_05.CHR ()
Sample: cal 38



Component	Retention	External	Units
COS	1.386	39.3530	
H2S	1.620	38.6524	
CS2	3.153	40.4122	
		118.4176	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_06.CHR ()
Sample: cal 19



Component	Retention	External	Units
COS	1.356	19.6283	
H2S	1.593	19.3106	
CS2	3.080	20.1660	
		59.1050	

APPENDIX B - South Flare Yokogawa GC 8000 H_2S CEMS Data

DeNovo Global Technologies, Inc.
CVREnergy - Wynnewod Refinery
South Flare CEMS Data
Date is: 11/29/2016

Timestamp	South flare H2S - ppm	
9:25:00	64.09	
9:26:00	64.09	
9:27:00	64.10	
9:28:00	63.31	Run 1
9:29:00	62.52	
9:30:00	62.52	
9:31:00	62.51	
9:32:00	62.50	
9:33:00	62.75	
9:34:00	62.97	
9:35:00	62.96	
9:36:00	62.97	
9:37:00	62.96	
9:38:00	62.85	
9:39:00	62.75	
9:40:00	62.75	
9:41:00	62.74	Run 2
9:42:00	62.74	
9:43:00	62.29	
9:44:00	61.83	
9:45:00	61.83	
9:46:00	61.83	
9:47:00	61.83	
9:48:00	62.06	
9:49:00	62.29	
9:50:00	62.28	
9:51:00	62.29	
9:52:00	62.30	
9:53:00	63.66	
9:54:00	65.02	Run 3
9:55:00	65.01	
9:56:00	65.03	
9:57:00	65.03	
9:58:00	63.43	
9:59:00	61.82	
10:00:00	61.82	
10:01:00	61.83	
10:02:00	61.84	
10:03:00	62.40	
10:04:00	62.97	
10:05:00	62.98	
10:06:00	62.98	
10:07:00	62.97	Run 4
10:08:00	62.63	
10:09:00	62.28	
10:10:00	62.29	
10:11:00	62.29	
10:12:00	62.29	
10:13:00	62.50	
10:14:00	62.74	
10:15:00	62.75	
10:16:00	62.75	
10:17:00	62.74	
10:18:00	62.97	
10:19:00	63.21	
10:20:00	63.21	Run 5
10:21:00	63.21	
10:22:00	63.20	
10:23:00	62.51	
10:24:00	61.82	
10:25:00	61.83	
10:26:00	61.84	
10:27:00	61.84	
10:28:00	63.44	
10:29:00	65.03	
10:30:00	65.02	
10:31:00	65.02	
10:32:00	65.03	
10:33:00	63.76	
10:34:00	62.51	
10:35:00	62.51	
10:36:00	62.51	
10:37:00	62.52	

10:38:00	62.17	Run 6
10:39:00	61.84	
10:40:00	61.84	
10:41:00	61.84	
10:42:00	61.84	
10:43:00	61.72	
10:44:00	61.60	
10:45:00	61.60	
10:46:00	61.60	
10:47:00	61.59	
10:48:00	61.16	
10:49:00	60.70	
10:50:00	60.70	
10:51:00	60.69	
10:52:00	60.69	
10:53:00	60.48	
10:54:00	60.25	
10:55:00	60.24	
10:56:00	60.23	
10:57:00	60.22	
10:58:00	60.57	
10:59:00	60.92	
11:00:00	60.92	
11:01:00	60.92	
11:02:00	60.92	
11:03:00	61.16	
11:04:00	61.39	
11:05:00	61.39	
11:06:00	61.38	
11:07:00	61.39	
11:08:00	61.05	
11:09:00	60.70	
11:10:00	60.69	
11:11:00	60.70	
11:12:00	60.71	
11:13:00	60.59	
11:14:00	60.47	
11:15:00	60.47	
11:16:00	60.47	
11:17:00	60.48	
11:18:00	60.48	
11:19:00	60.49	
11:20:00	60.49	
11:21:00	60.47	
11:22:00	60.46	
11:23:00	60.25	
11:24:00	60.02	
11:25:00	60.02	
11:26:00	60.03	
11:27:00	60.03	
11:28:00	60.26	
11:29:00	60.48	
11:30:00	60.49	
11:31:00	60.49	
11:32:00	60.48	
11:33:00	60.93	
11:34:00	61.38	
11:35:00	61.38	
11:36:00	61.39	
11:37:00	61.40	
11:38:00	61.73	
11:39:00	62.06	
11:40:00	62.05	
11:41:00	62.07	
11:42:00	62.08	
11:43:00	61.73	
11:44:00	61.39	
11:45:00	61.38	
11:46:00	61.39	
11:47:00	61.39	
11:48:00	61.72	
11:49:00	62.07	Run 7
11:50:00	62.06	
11:51:00	62.07	
11:52:00	62.08	
11:53:00	61.95	
11:54:00	61.84	
11:55:00	61.84	
11:56:00	61.84	
11:57:00	61.85	
11:58:00	62.30	
11:59:00	62.74	
12:00:00	62.76	
12:01:00	62.76	
12:02:00	62.75	
12:03:00	62.75	
12:04:00	62.75	
12:05:00	62.74	
12:06:00	62.74	
12:07:00	62.74	
12:08:00	64.22	
12:09:00	65.71	

12:10:00	65.71	Run 8
12:11:00	65.70	
12:12:00	65.71	
12:13:00	64.58	
12:14:00	63.43	
12:15:00	63.42	
12:16:00	63.42	
12:17:00	63.43	
12:18:00	63.09	
12:19:00	62.76	
12:20:00	62.76	
12:21:00	62.76	
12:22:00	62.76	
12:23:00	63.33	
12:24:00	63.89	
12:25:00	63.89	
12:26:00	63.89	
12:27:00	63.90	
12:28:00	63.56	Run 9
12:29:00	63.21	
12:30:00	63.21	
12:31:00	63.21	
12:32:00	63.22	
12:33:00	63.22	
12:34:00	63.23	
12:35:00	63.22	
12:36:00	63.21	
12:37:00	63.22	
12:38:00	62.74	
12:39:00	62.28	
12:40:00	62.29	
12:41:00	62.30	
12:42:00	62.30	
12:43:00	62.88	
12:44:00	63.46	Run 10
12:45:00	63.45	
12:46:00	63.44	
12:47:00	63.44	
12:48:00	62.30	
12:49:00	61.17	
12:50:00	61.16	
12:51:00	61.16	
12:52:00	61.16	
12:53:00	61.95	
12:54:00	62.74	
12:55:00	62.76	
12:56:00	62.76	
12:57:00	62.75	
12:58:00	62.52	Run 11
12:59:00	62.30	
13:00:00	62.30	
13:01:00	62.30	
13:02:00	62.30	
13:03:00	62.76	
13:04:00	63.22	
13:05:00	63.22	
13:06:00	63.21	
13:07:00	63.21	
13:08:00	62.41	
13:09:00	61.61	
13:10:00	61.61	
13:11:00	61.62	
13:12:00	61.61	
13:13:00	61.72	
13:14:00	61.84	
13:15:00	61.85	
13:16:00	61.84	Run 12
13:17:00	61.83	
13:18:00	60.92	
13:19:00	60.02	
13:20:00	60.01	
13:21:00	60.01	
13:22:00	60.01	
13:23:00	60.91	
13:24:00	61.82	
13:25:00	61.83	
13:26:00	61.83	
13:27:00	61.83	
13:28:00	61.37	
13:29:00	60.92	
13:30:00	60.92	
13:31:00	60.91	
13:32:00	60.92	
13:33:00	60.46	
13:34:00	59.99	
13:35:00	60.00	
13:36:00	60.02	
13:37:00	60.01	
13:38:00	60.69	
13:39:00	61.37	
13:40:00	61.37	
13:41:00	61.38	
13:42:00	61.38	
13:43:00	61.48	
13:44:00	61.59	
13:45:00	61.59	
13:46:00	61.59	
13:47:00	61.60	
13:48:00	61.72	
13:49:00	61.83	
13:50:00	61.83	
13:51:00	61.82	
13:52:00	61.82	
13:53:00	61.94	

13:54:00	62.06	Run 13
13:55:00	62.06	
13:56:00	62.06	
13:57:00	62.06	
13:58:00	62.39	
13:59:00	62.73	
14:00:00	62.73	
14:01:00	62.74	
14:02:00	62.74	
14:03:00	62.40	
14:04:00	62.06	
14:05:00	62.07	Run 14
14:06:00	62.05	
14:07:00	62.05	
14:08:00	61.37	
14:09:00	60.68	
14:10:00	60.68	
14:11:00	60.69	
14:12:00	60.69	
14:13:00	60.24	
14:14:00	59.78	
14:15:00	59.78	
14:16:00	59.78	
14:17:00	59.78	
14:18:00	61.49	
14:19:00	63.20	Run 15
14:20:00	63.20	
14:21:00	63.19	
14:22:00	63.19	
14:23:00	63.18	
14:24:00	63.18	
14:25:00	63.20	
14:26:00	63.20	
14:27:00	63.19	
14:28:00	63.76	
14:29:00	64.33	
14:30:00	64.32	
14:31:00	64.32	
14:32:00	64.33	Run 16
14:33:00	63.08	
14:34:00	61.82	

APPENDIX C - Gas Calibration Certificates / Support Documentation

Airgas
an Air Liquide company

Airgas USA, LLC
616 Miller Cut Off Rd.
LaPorte, TX 77571
281-842-6900
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: PRIMARY STANDARD

Customer: DENOVO GLOBAL TECHNOLOGIES INC - LA PORTE , TX
Part Number: X05ME78P33A0000
Cylinder Number: FF48905
Laboratory: 124 - LaPorte Mix (SAP) - TX
Analysis Date: Oct 19, 2016
Lot Number: 126-400785023-1

Reference Number: 126-400785023-1
Cylinder Volume: 31.7 CF
Cylinder Pressure: 1606 PSIG
Valve Outlet: 330

Expiration Date: Oct 19, 2017

Primary Standard Gas Mixtures are traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration (Mole %)	Analytical Uncertainty
CARBON DISULFIDE	150.0 PPM	161.4 PPM	+/- 1%
CARBONYL SULFIDE	150.0 PPM	157.4 PPM	+/- 1%
HYDROGEN SULFIDE	150.0 PPM	154.7 PPM	+/- 1%
ETHANE	21.00 %	21.01 %	+/- 1%
METHANE	Balance		

Notes:
RECERTIFICATION
DENOVO GLOBAL TECHNOLOGIES INC
PO#: RECERT 9/29/2016

Approved for Release

Airgas

Airgas USA, LLC
616 Miller Cut Off Road
Laporte, TX 77571
281-842-6900
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: CERTIFIED STANDARD-SPEC

Customer:	DENOVO GLOBAL TECHNOLOGIES INC - LAPORTE, TX	Reference Number:	126-400732979-1
Part Number:	X05ME78C33A0040	Cylinder Volume:	42 CF
Cylinder Number:	FF37344	Cylinder Pressure:	2015 PSIG
Laboratory:	ASG - LaPorte Mix (SAP) - TX	Valve Outlet:	330
Analysis Date:	Jul 05, 2016		
Lot Number:	126-400732979-1		

Expiration Date: Jul 05, 2017

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration (Mole %)	Analytical Uncertainty
CARBON DISULFIDE	500.0 PPM	509.6 PPM	+/- 2%
CARBONYL SULFIDE	500.0 PPM	481.2 PPM	+/- 2%
HYDROGEN SULFIDE	500.0 PPM	488.2 PPM	+/- 2%
ETHANE	21.00 %	21.02 %	+/- 2%
METHANE	Balance		

Notes:.
PO# DGT-7305

Approved for Release

APPENDIX D - Example Calculations

EXAMPLE CALCULATIONS

Correction for raw emission concentrations to bias/drift corrected values:

Eq. 1: C SUB corrected = (C SUB measured - C SUB o) C SUB ma OVER { C SUB m - C SUB o }

where:

$C_{corrected}$ = Average calibration corrected concentration, ppm or percent

$C_{measured}$ = Average measured concentration, ppm, or percent

C_o = Average of pre- and post-test system bias response for the zero gas, ppm or percent

C_m = Average of pre- and post-test system bias response for the upscale gas, ppm or percent

C_{ma} = Actual concentration of the upscale gas, ppm or percent

Relative Accuracy Calculation:

Eq. 2: D = 1 OVER n n OVER φ OVER { i=1 } di

where:

D = Arithmetic mean of the difference between the RM and CEMS value

n = Number of data points

di = Difference between the RM and CEMS for individual data points

Standard Deviation Calculation:

Eq. 3: S SUB d = [{ { n OVER φ OVER {i=1 }d SUB i SUP 2 }- { (n OVER φ OVER {i=1 }d SUB i) SUP 2 } OVER n } OVER { n-1 }] SUP { 1/2 }

where:

Sd = Standard deviation of the difference between the RM and CEMS value

Confidence Coefficient Calculation:

Eq. 4: CC = t SUB { 0.975 } S SUB d OVER SQRT n

where:

CC = Two Tailed confidence coefficient corresponding to 2.5% error

$t_{0.975}$ = t-value correcting for –1 degrees of freedom = 2.306

Relative Accuracy of CEMS to RM Calculation:

Eq. 5: RA = { |D| + |CC| } OVER RM * 100%

where:

RA	=	Relative accuracy of the CEMS system to the RM
D	=	Absolute value of the mean of the differences
CC	=	Absolute value of the confidence coefficient
RM	=	Average RM value or the applicable emission standard

Emission Rate Calculation lbs/MMBtu:

FUNC { E~=~C_corrected`~MW over {385.33*10^6}~`F_d`{{20.9} over {(20.9`-`%O_{2d})}}}

Where:

E	=	Pollutant emission rate, ng/J (lbs/million Btu).
$C_{corrected}$	=	Average calibration corrected concentration, ppm or percent
MW	=	Molecular weight of compound, lbs/lb-mol
F_d	=	Volume of combustion components per unit of heat content, scm/J (scf/million Btu).
$\%O_{2d}$	=	Concentration of oxygen on a dry basis, percent.

APPENDIX E - Quality Assurance / Quality Control

QUALITY ASSURANCE / QUALITY CONTROL

Specific quality control measures were used to insure the generation of reliable data from all sampling and analysis activities. Proper collection and organization of information followed by clear and concise reporting of the data was a primary goal in the project.

The objective of a quality assurance/quality control (QA/QC) program is to ensure that the precision and accuracy of all environmental data generated by DeNovo Global Technologies, Inc. is commensurate with data quality objectives (DQOs). DQOs are based on a common understanding of the intended end use(s) of the data, the measurement process, and the availability of resources. Once DQOs are established, formally or informally, QC protocol can be defined for the measurements.

In this project, the final data users will be Wynnewood Refining Company, USEPA Region VI, and the State of Oklahoma. The DQOs for this project are to generate legally defensible data to be used to demonstrate 40 CFR Part 60 and Part 63 compliance.

Two basic goals of a QC program are to:

1) Control errors; and
2) Verify that the entire analytical method is operating within acceptable performance limits.

Use of qualified personnel, reliable and well-maintained equipment, appropriate calibrations and standards, and close supervision of all operations are important components of the QC program. The following sections describe the QC results for maintaining instruments and equipment in a state of calibration (defines the accuracy or bias error), results for measuring a continuously maintained state of cleanliness (eliminates interference or contamination), and the paper trail which documents that the methods were performed to instructions, calibrated within method performance standards, and/or traceable to National Technical Information Services (NTIS) standard reference materials. Standards of QA set forth in the Quality Assurance Handbook for Air Pollution Measurements Systems, Volume III (USEPA-600/4-77-027b) were strictly followed.

FIELD DATA REDUCTION

Example calculations are used in the field to check on sampling conditions and a list of formulas used to reduce the field data. The data collected was reviewed in the field by the Project Manager. Errors or discrepancies were noted on the data sheet. Appendices of this report present the standardized forms that were used to record field sampling data.

INTERNAL QC CHECKS AND FREQUENCY

QC checks were performed to ensure the collection of representative samples and the generation of valid analytical results of these samples. These checks were performed by project participants throughout the program.

QA PROCEDURES

The following QA procedures were implemented during this test program:

- Use of designated sampling and analytical equipment. The sampling equipment used in this test met all calibration and operating criteria of the applicable ODEQ and USEPA Methods.

- Sampling system was calibrated and operated according to ODEQ and USEPA documented procedures. All site activities including audit results were logged into the daily site book.

- Equipment calibration - The mobile sampling equipment is calibrated with two concentrations of USEPA Protocol 1 gasses and a zero gas before the first test. Calibration span setting are check after each run. Other test equipment is calibrated in accordance with USEPA specifications in Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III (USEPA-600/4-77-027b).

DENOVO

December 12, 2016

Mr. David M. Heller
Environmental Engineer III
Wynnewood Refining Company
906 South Powell Street
Wynnewood, Oklahoma 73098

Re: West Flare – Yokogawa GC 8000 H_2s Gas Chromatographs Annual RATA Performance Test, CVR Energy, Wynnewood Refining Company, Wynnewood, Oklahoma

Dear Mr. Heller:

Enclosed are 3 hard copies and 1 copy on CD of the final test report for the West Flare – Yokogawa GC 8000 H_2s Gas Chromatographs Annual RATA Performance Test at the CVR Energy. – Wynnewood Refinery facility located in Wynnewood, Oklahoma.

If you have any questions or comments, please do not hesitate to call us at (281) 251-0399. DeNovo appreciates this opportunity and we look forward to continuing our successful and lasting relationship.

Sincerely,

Louis M. Esposito

Louis M. Esposito
Director
LME/th

17902 East Strack Drive, Spring, TX 77379
281.251.0399, http://www.denovogt.com

DENOVO

WYNNEWOOD REFINING™

A CVR Refining, LP Company

WEST FLARE
YOKOGAWA GC 8000 H_2S GAS CHROMATOGRAPH

2016 ANNUAL RATA PERFORMANCE TEST

CVR ENERGY – WYNNEWOOD REFINERY

WYNNEWOOD, OKLAHOMA

Final Report
December 12, 2016

Project # 5281.03.05

17902 East Strack Drive, Spring, TX 77379
281.251.0399, http://www.denovogt.com

SUMMARY

DeNovo Global Technologies, Inc. (DeNovo) conducted the Annual Relative Accuracy Test Audit (RATA) on the plant West Flare GC, H_2S Continuous Emissions Monitoring Systems (CEMS) associated with the CVR Energy. – Wynnewood Refining Company (WRC) petroleum refinery located in Wynnewood, Oklahoma. Annual certification testing was conducted on the West Flare Yokogawa GC 8000 H_2S Gas Chromatograph for the pollutant Hydrogen Sulfide (H_2S). The tests were performed to provide documentation of compliance with quality assurance provisions for the CEMS and process units as governed under Federal regulations associated with 40 CFR Part 60, 40 CFR Part 63 along with the facility state operating permit.

Testing was conducted on November 29, 2016. The test procedures were performed in accordance with 40 CFR, Part 60, Appendix B, utilizing a modified EPA Reference Methods 15 for the determination of H_2S. This report presents the results of that testing.

Mr. David M. Heller of Wynnewood Refining Company (WRC) was the project coordinator. The team leader for DeNovo was Mr. Louis Esposito.

BASED ON THE TEST RESULTS, THE WEST FLARE YOKOGAWA GC 8000 H_2S GAS CHROMATOGRAPHS PASSED THE 2016 ANNUAL RELATIVE ACCURACY TEST AUDIT.

Louis M. Esposito
Director
DeNovo Global Technologies, Inc

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APPENDIX D - Example Calculations .....
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1.0 INTRODUCTION

DeNovo Global Technologies, Inc. (DeNovo) conducted the Annual RATA Performance Test (RATA) for the West Flare Yokogawa GC 8000 H_2S Gas Chromatograph associated with the WRC operations in Wynnewood, Oklahoma.

The H_2S Annual Performance RATA series consisted of sixteen samples taken within >3 <6 hours for each of the test series.

The subsequent sections of this report present results for the test as follows:

2.0 — Test Methods and Equipment Summary
3.0 — Summary of Test Procedures and Results

The appendices provide documentation and supporting data. The appendices are organized as follows:

Appendix A — Emission Performance RM Calibration and Run Test Data
Appendix B — Operational Data
Appendix C — Gas Calibration Certificates/Support Documentation
Appendix D — Example Calculations
Appendix E — Quality Assurance

2.0 TEST METHODS AND EQUIPMENT SUMMARY

The test program was designed to provide data for documentation of compliance with federal regulations associated with NSPS Subparts and state operating permit requirements related to certification of unit emissions. Specifically, testing for the WRC facility consisted of sampling the West Flare Yokogawa GC 8000 Gas Chromatograph for H_2S. The following is a brief description of the units:

West Flare H_2S CEMS:

H_2S Analyzer – Yokogawa Gas Chromatograph
Model: GC8000
Serial No: KGC - 11394
Span Range- 0 – 300 ppm H_2S
Plant I.D No.: 1002700
Range: 300 ppm

The Plant Data Acquisition System (DAS) is managed by a Total Distributive Control (TDC) processor which compiles process data points from the units into the Plant History Database (PHD). The PHD system provides one minute averaged data.

3.0 SUMMARY OF TEST PROCEDURES AND RESULTS

A summary of the RATA test series is given in Table 3-1 below.

3.1 West Flare Emission Performance Test

RATA testing was performed on November 29, 2016 on the West Flare Yokogawa GC 8000 H_2S Gas Chromatographs. A minimum of sixteen (16) test runs were used from sample bag injections for the unit test series. Testing was performed in accordance with EPA Method15 (modified), gas chromatography sampling and analytical test procedures to calculate the average for the RA determination for the unit. The RM average was then compared with the CEM averages to determine the analyzer relative accuracy. The RA Performance Specification for H_2S analyzer specifies the CEMS to be within 20% of the reference method, or 10% of the emission standard (162 ppm).

Based on the test results, the West Flare Yokogawa GC 8000 H_2S Gas Chromatograph Passed the Annual RATA certification.

3.2 Sampling and Analytical Procedures

3.2.1 RM - Gas Chromatography Instrumentation

The compound to be analyzed for was hydrogen sulfide (H_2S). The instrument used for the analyses was a SRI 8610C equipped with a flame photometric detector (FPD). The detector temperature was set at 125^{0}C, and a sample flow of 70 ml per minute. Column temperature was set at 45^{0}C. A 1.0 - milliliter sample loop mounted on an automatic sampling valve was used to inject both calibration and sample gases on to two Chromasil 310 3-meter x 1/8" packed Teflon columns configured in series.

3.2.2 GC Calibration Procedure

The GC was calibrated using $H_2S/COS/CS_2$ certified gas. A 7-point curve was obtained by diluting the standard with nitrogen gas to 100% and 50% of a 488.2 ppm gas standard and also diluting the standard with nitrogen gas to 100%, 50%, 25%, 12.5% and 0% of the 154.7 ppm gas standard concentration. The dilutions were accomplished within the precision syringe by taking in a specified amount of standard and then diluting with the nitrogen. Runs were done at each calibration point until three consecutive runs were within 10% of each other with the final analysis point being added to the curve. Certified H_2S standards within the range of the facility operating conditions were injected to confirm calibration.

3.2.3 GC Sampling Procedure

The flare gas samples measured by the Yokogawa GC 8000 H_2S Gas Chromatographs were sampled and measured according to the requirements and procedures of EPA Reference Method 15 with the following two modifications. Gas samples were collected in Tedlar bags instead of direct injection and the GC was calibrated by means of certified gas standards versus permeation tubes. Each Tedlar bag was purged with nitrogen prior to use and then filled directly from the Yokogawa fuel gas analyzer sample port feed tap. The sample port taps were fitted with 1/4" stainless swag-lok fittings and connected to Teflon tubing. The sample line was purged prior to each sample. The labeled tedlar bags were then immediately brought to the RM GC for immediate analysis via direct injection. No dilutions of the sample were necessary since the established calibration table covered the appropriate range.

3.2.4 GC Data Collection and Integration

The results were integrated using Peak Simple GC software, with data analysis specific to H_2S concentrations reported in parts per million (ppm)

Table 3-1: West Flare Yokogawa GC 8000 H2S CEMS Rata

Run No.	RM H_2S (ppm)	CEMS H_2S (ppm)
1.	70.97	71.06
2.	77.6	71.78
3.	76.24	75.05
4.	81.98	74.76
5.	76.00	71.79
6.	67.70	72.01
7.	62.38	72.7
8.	60.01	67.21
9.	54.60	69.27
10.	59.70	64.68
11.	58.39	57.81
12.	54.01	61.3
13.	55.75	63.28
14.	77.35	66.53
15.	77.02	64.99
16.	77.89	68.13
Avg	67.97	68.27
Mean Difference	-0.2969	
StdDe	8.1160	
ConC.	4.3238	
RA%	6.8	
Ac/Std %	2.9	
Status	PASS	

H_2S shall not exceed 20.0 percent of the mean value of the reference method test data or 10 percent of the Relative Standard, whichever is greater

APPENDIX A - West Flare Yokogawa GC 8000 H_2S Test Data

DeNovo Global Technologies, Inc. *ENVIRONMENTAL ENGINEERING AND TESTING SERVICES*

17902 East Strack Drive
Spring, Tx 77379

Phone: 281-251-0399
Fax: 281-251-1301

CLIENT:	CVR Energy	DATE:	11/29/2016
LOCATION:	Wynnewood, Oklahoma	PROJECT NO.:	5281.03.05
LOAD:	N/A	PERSONNEL:	Louis Esposito
ANALYZER:	Yokogawa GC8000	SOURCE:	West Flare
I.D.:	KGC-11394	APPLICABLE STANDARD:	162

RELATIVE ACCURACY TESTING SUMMARY - West Flare H2S ANALYZER

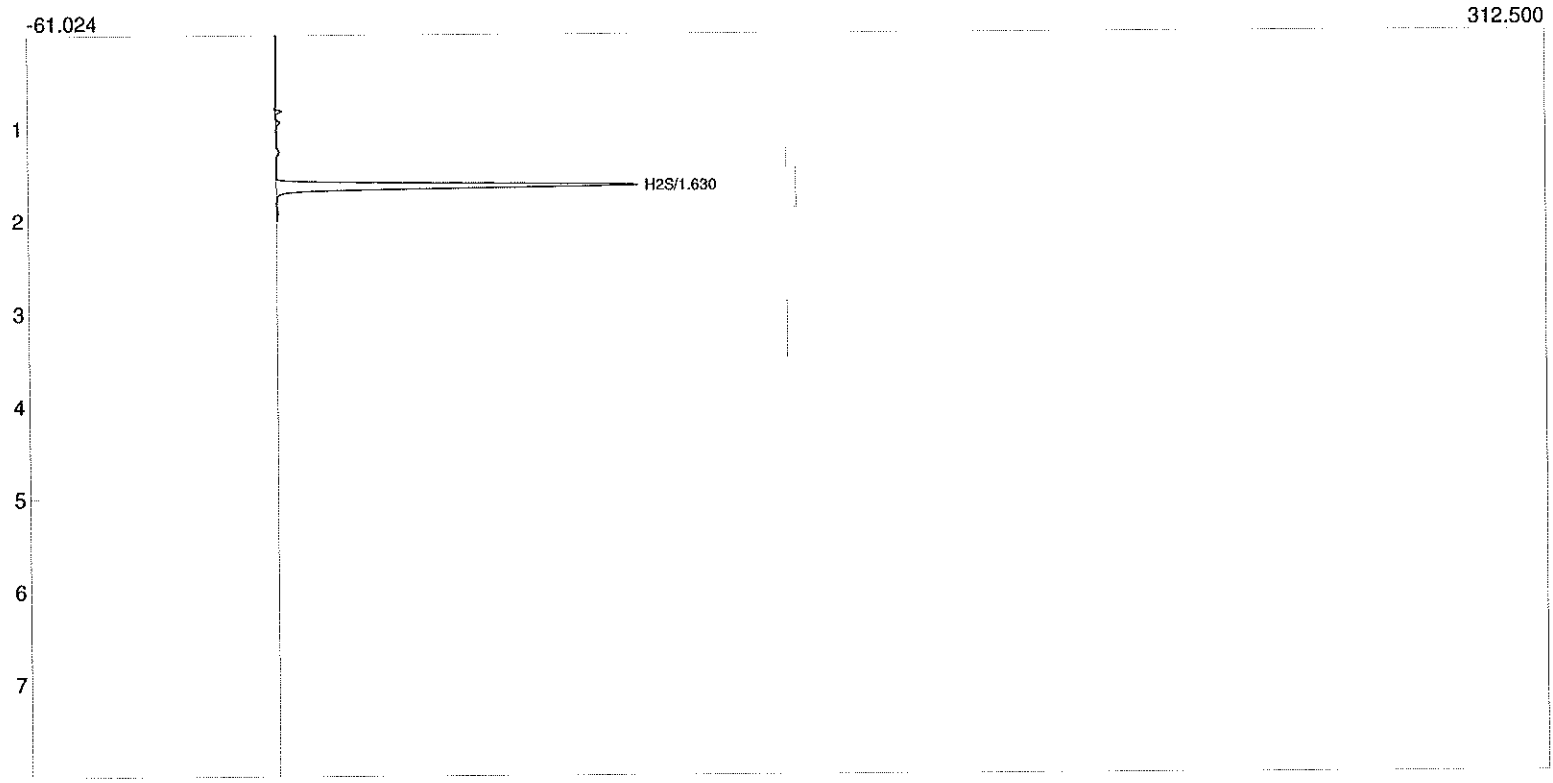
The table below contains the results of testing and calcultions performed on the date(s) listed.
The testing was performed in accordance with 40 CFR Part 60, Appendix B, Performance Specification 7

West Flare			
TIME	RM	CEMS	Dif
13:37	70.97	71.06	-0.09
13:45	77.60	71.78	5.82
13:57	76.24	75.05	1.19
14:06	81.98	74.75	7.23
14:21	76.00	71.79	4.21
14:33	67.70	72.01	-4.31
14:45	62.38	72.70	-10.32
14:57	60.01	67.21	-7.20
15:09	54.60	69.27	-14.67
15:21	59.70	64.68	-4.98
15:45	58.39	57.81	0.58
15:57	54.01	61.30	-7.29
16:09	55.75	63.28	-7.53
16:16	77.35	66.53	10.82
16:22	77.02	64.99	12.03
16:31	77.89	68.13	9.76
Average	**67.97**	**68.27**	**-0.30**

RM AVERAGE:	67.9744	ppmv
CEMS AVERAGE:	68.2713	ppmv
ARITHMETIC MEAN:	-0.2969	
STANDARD DEVIATION:	8.1160	
CONFIDENCE COEFFICIENT:	4.3238	
ACCURACY VS. RM AVERAGE:	**6.8**	%
ACCURACY VS. APPLICABLE STANDARD:	**2.9**	%

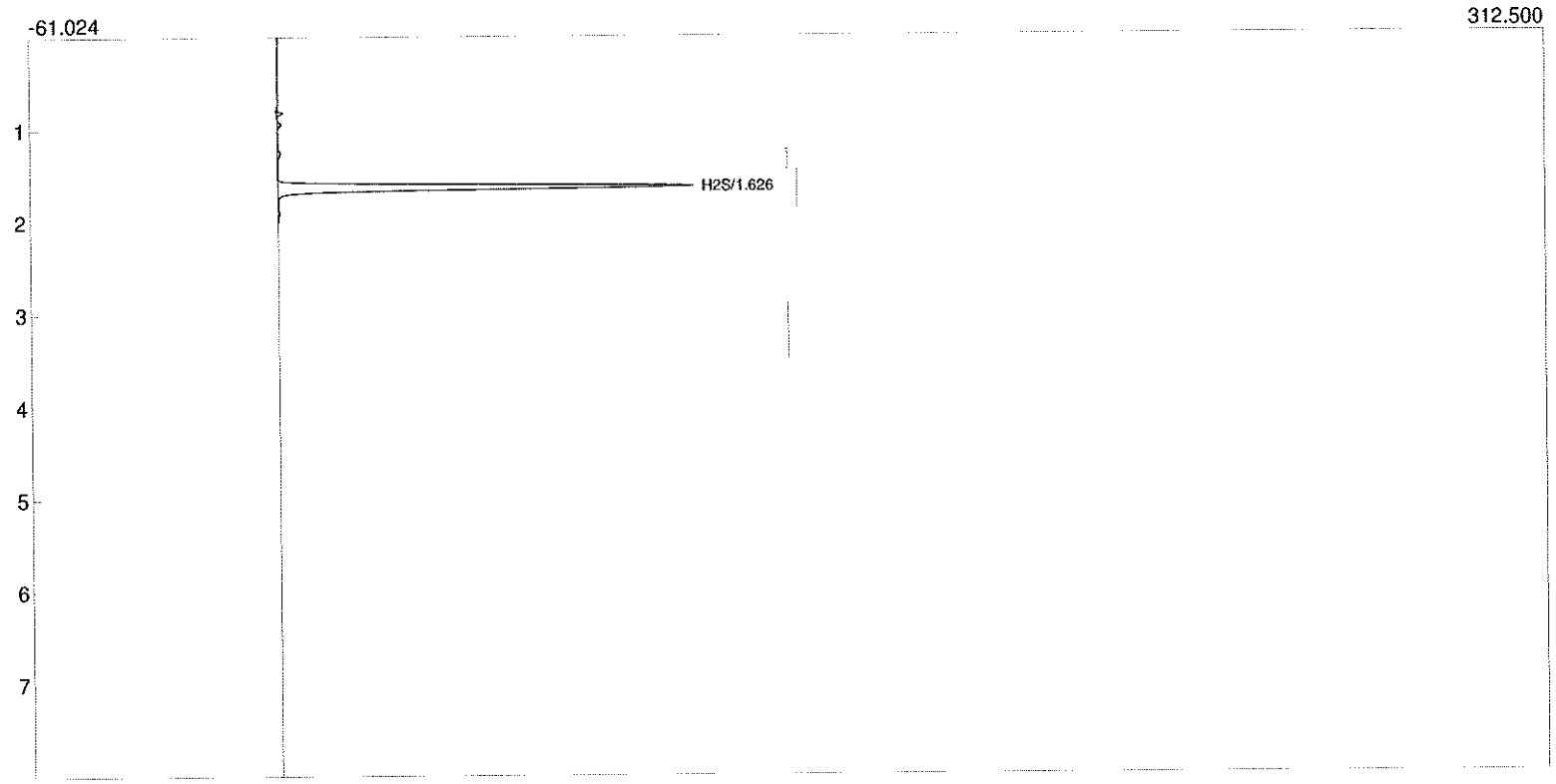
THE ABOVE DATA CERTIFIES THAT THE C.E.M. FOR WHICH THIS DATA IS
PROVIDED PASSES ___X___, FAILS _____ THE RELATIVE ACCURACY TEST

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_59.CHR ()
Sample: WF Run 1



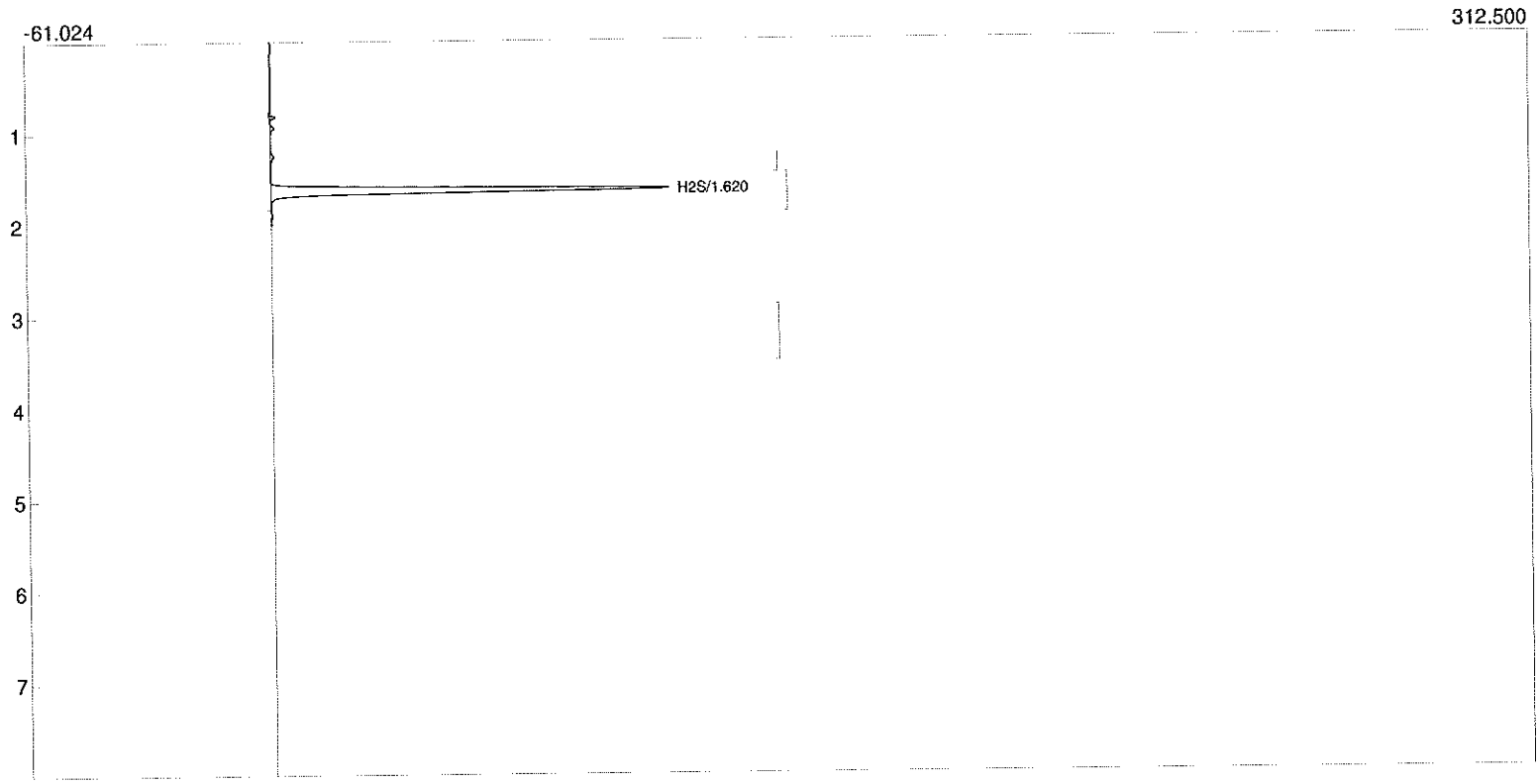
Component	Retention	External	Units
H2S	1.630	70.9778	
		70.9778	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_60.CHR ()
Sample: WF Run 2



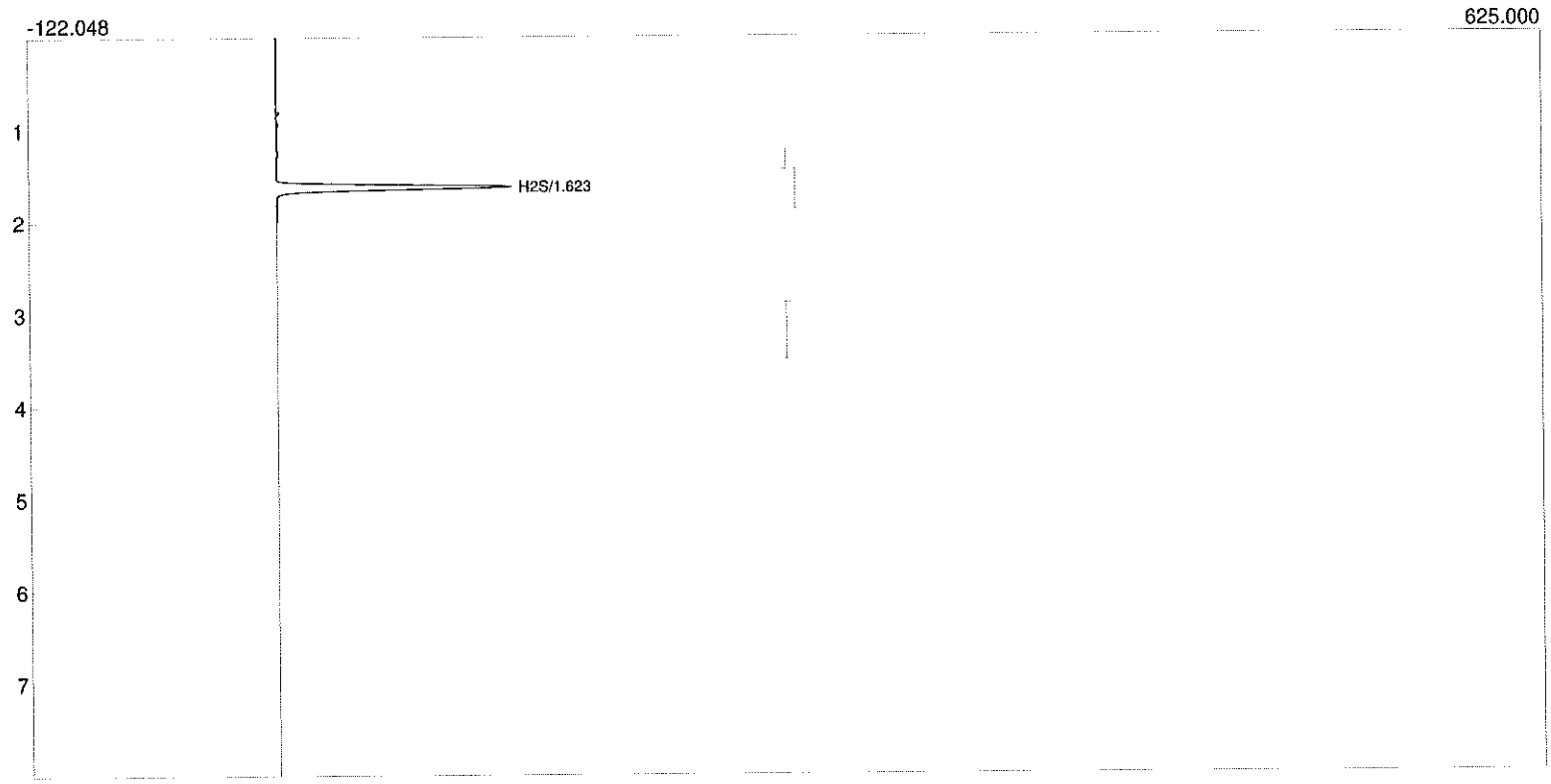
Component	Retention	External	Units
H2S	1.626	77.6170	
		77.6170	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_61.CHR ()
Sample: WF Run 3



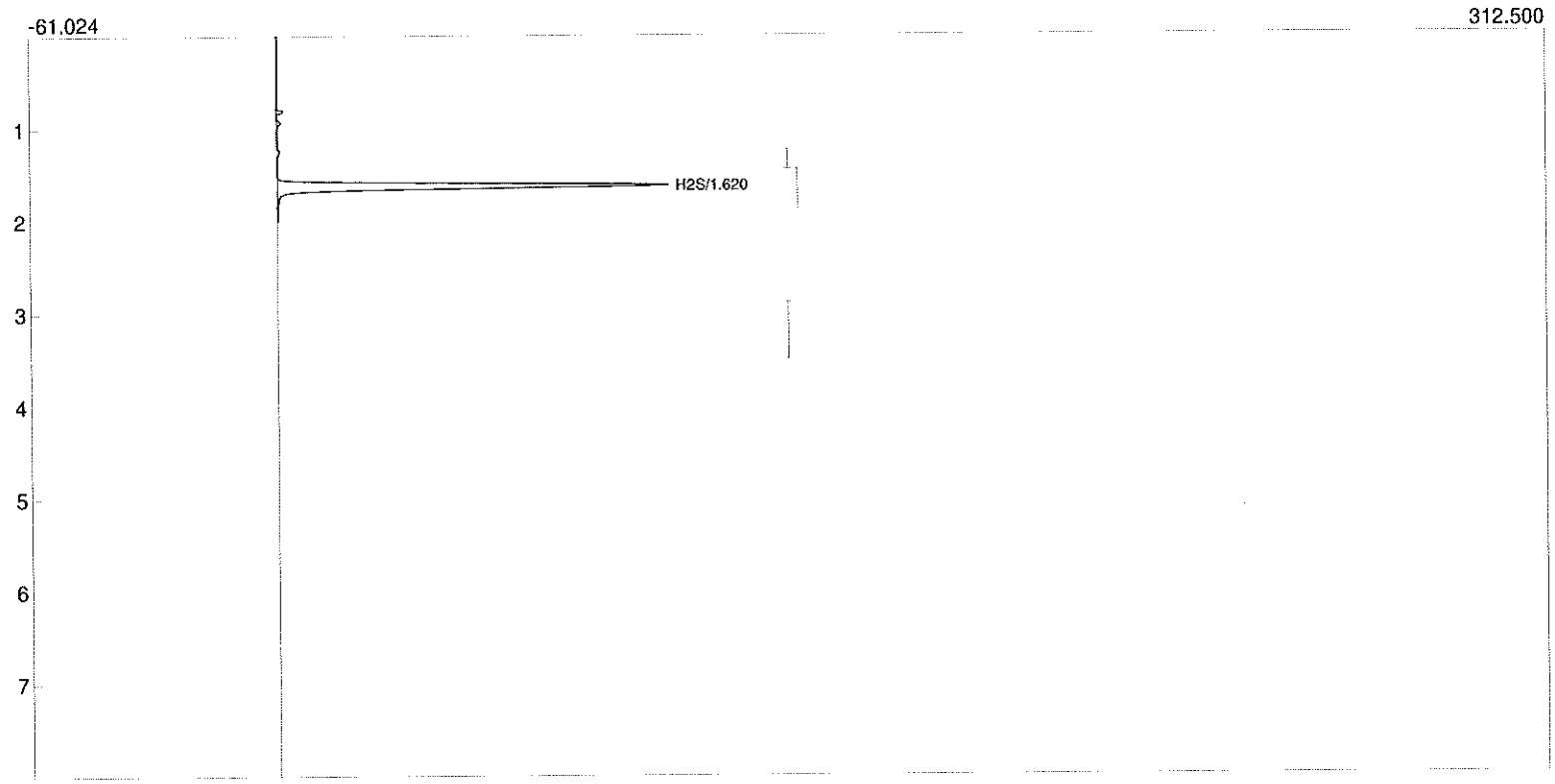
Component	Retention	External	Units
H2S	1.620	76.2407	
		76.2407	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_62.CHR ()
Sample: WF Run 4



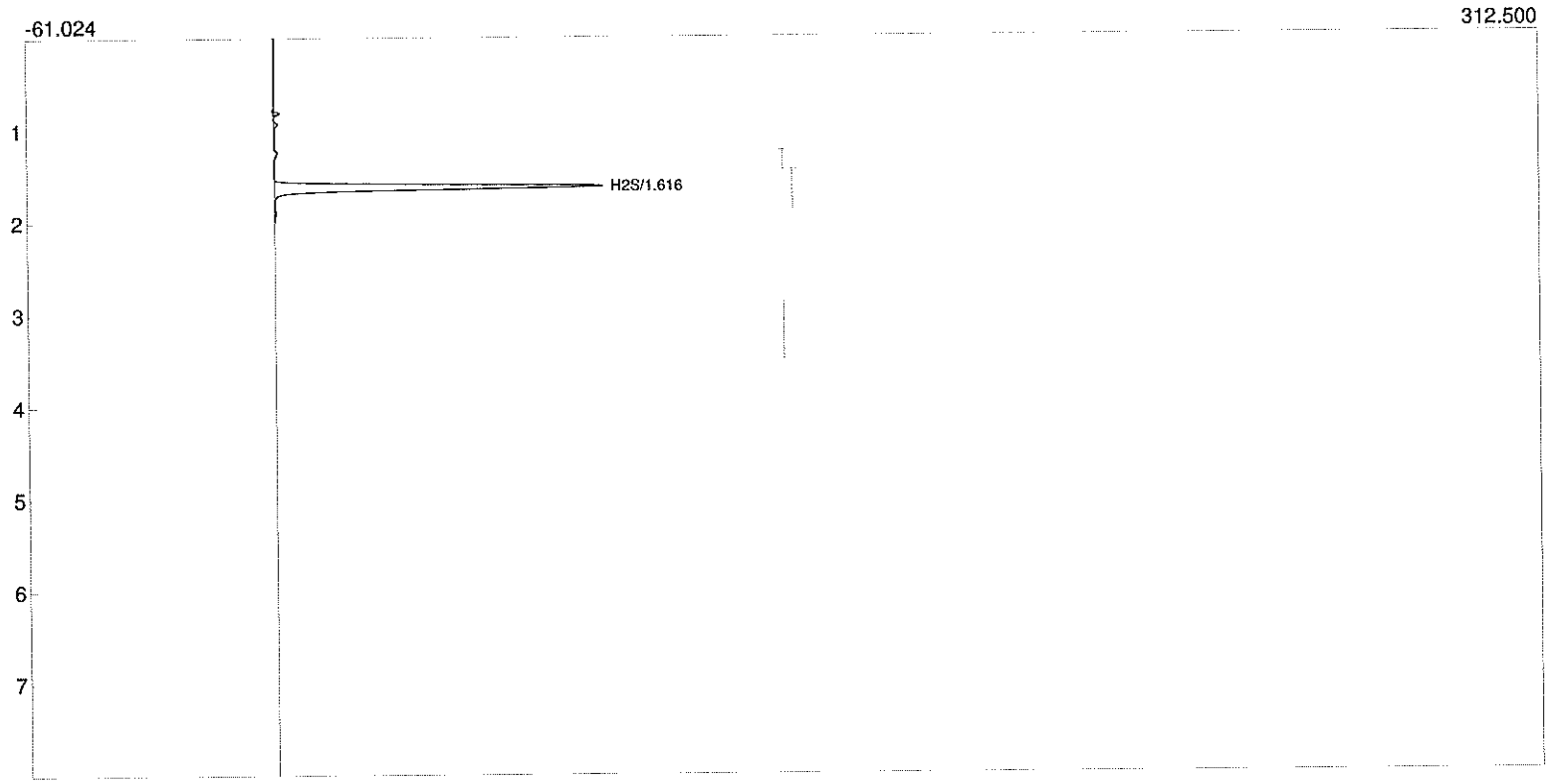
Component	Retention	External	Units
H2S	1.623	81.9829	
		81.9829	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_63.CHR ()
Sample: WF Run 5



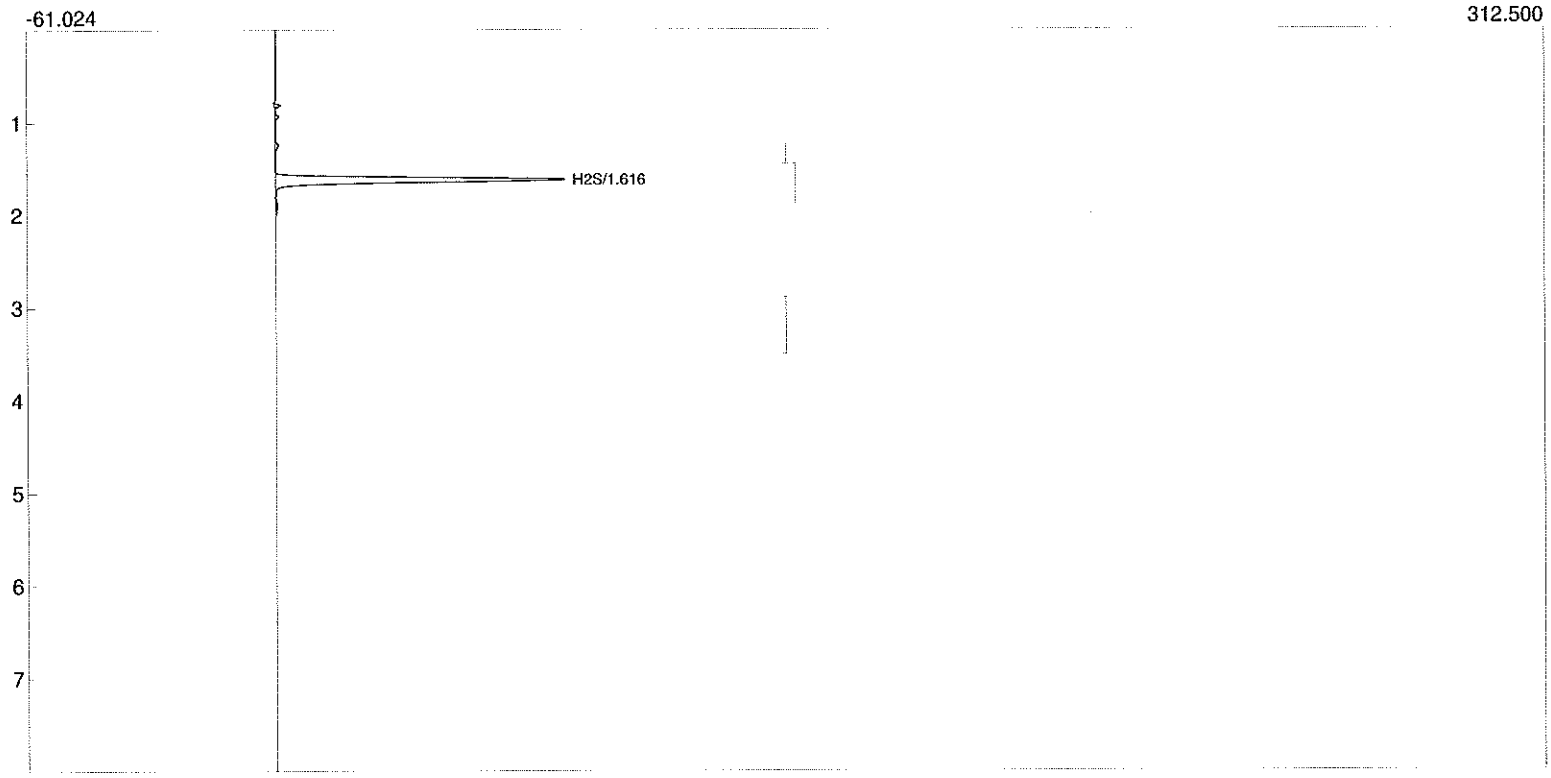
Component	Retention	External	Units
H2S	1.620	76.0054	
		76.0054	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_64.CHR ()
Sample: WF Run 6



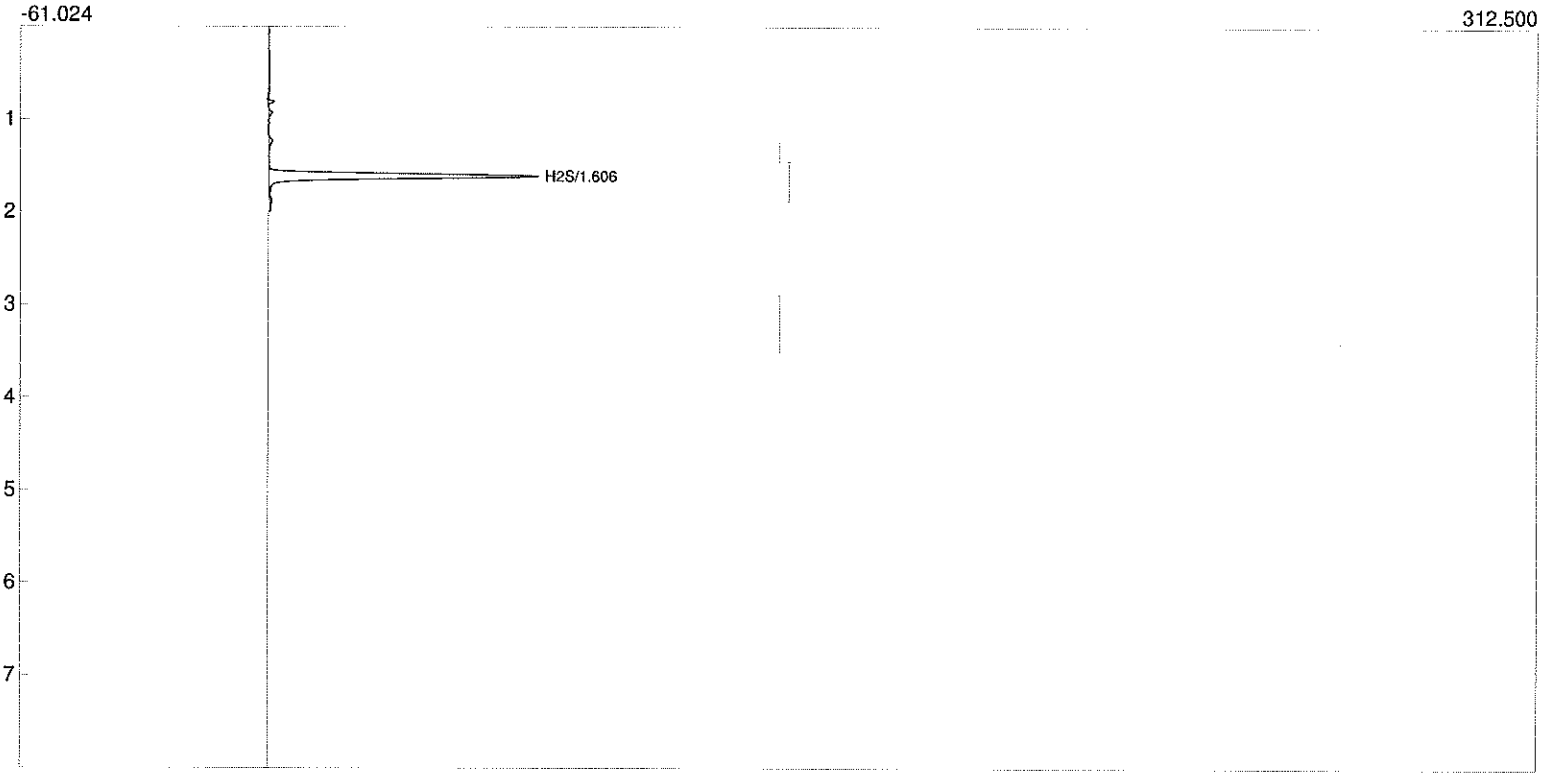
Component	Retention	External	Units
H2S	1.616	67.7022	
		67.7022	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_65.CHR ()
Sample: WF Run 7



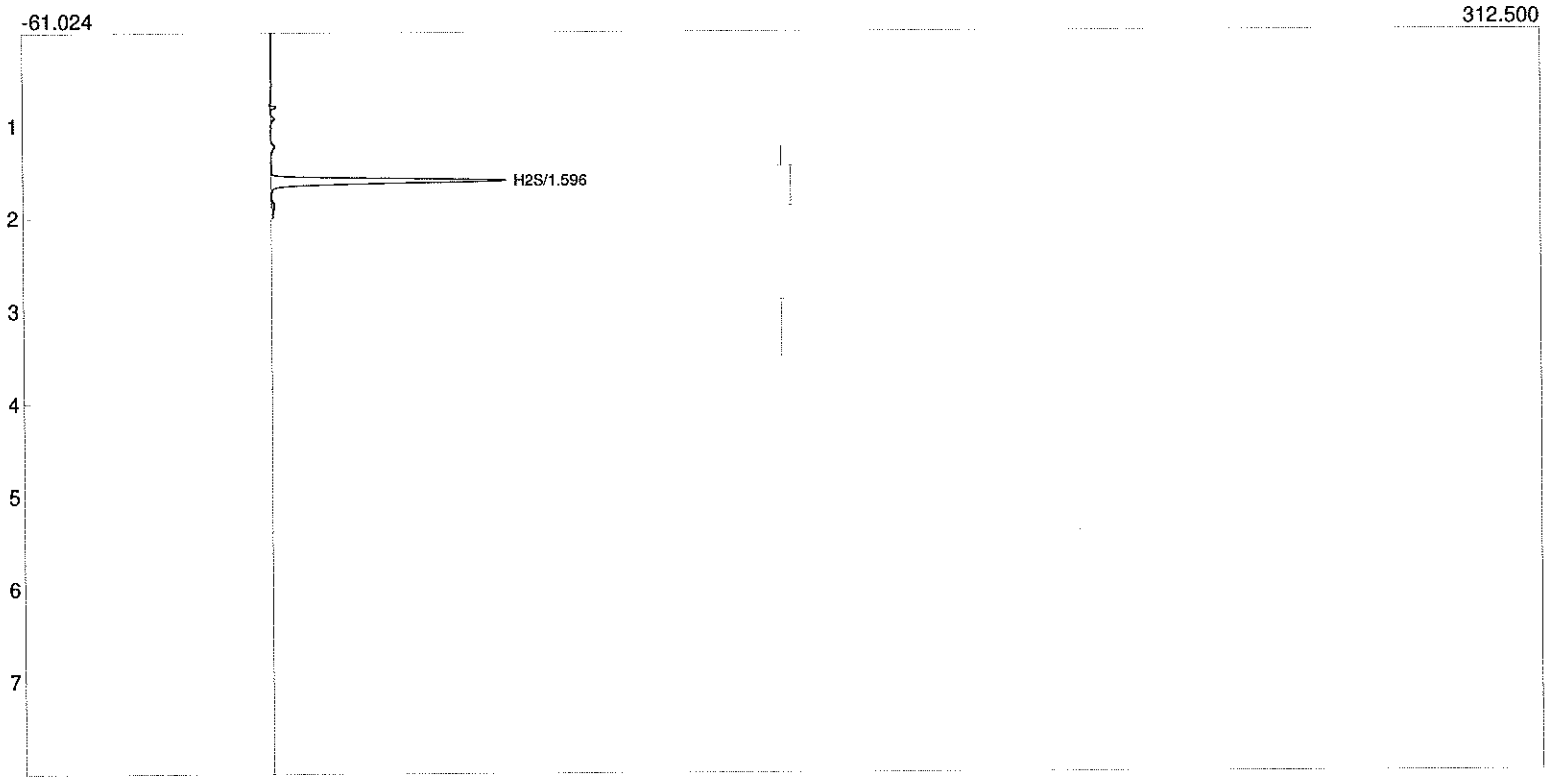
Component	Retention	External	Units
H2S	1.616	62.3810	
		62.3810	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_66.CHR ()
Sample: WF Run 8



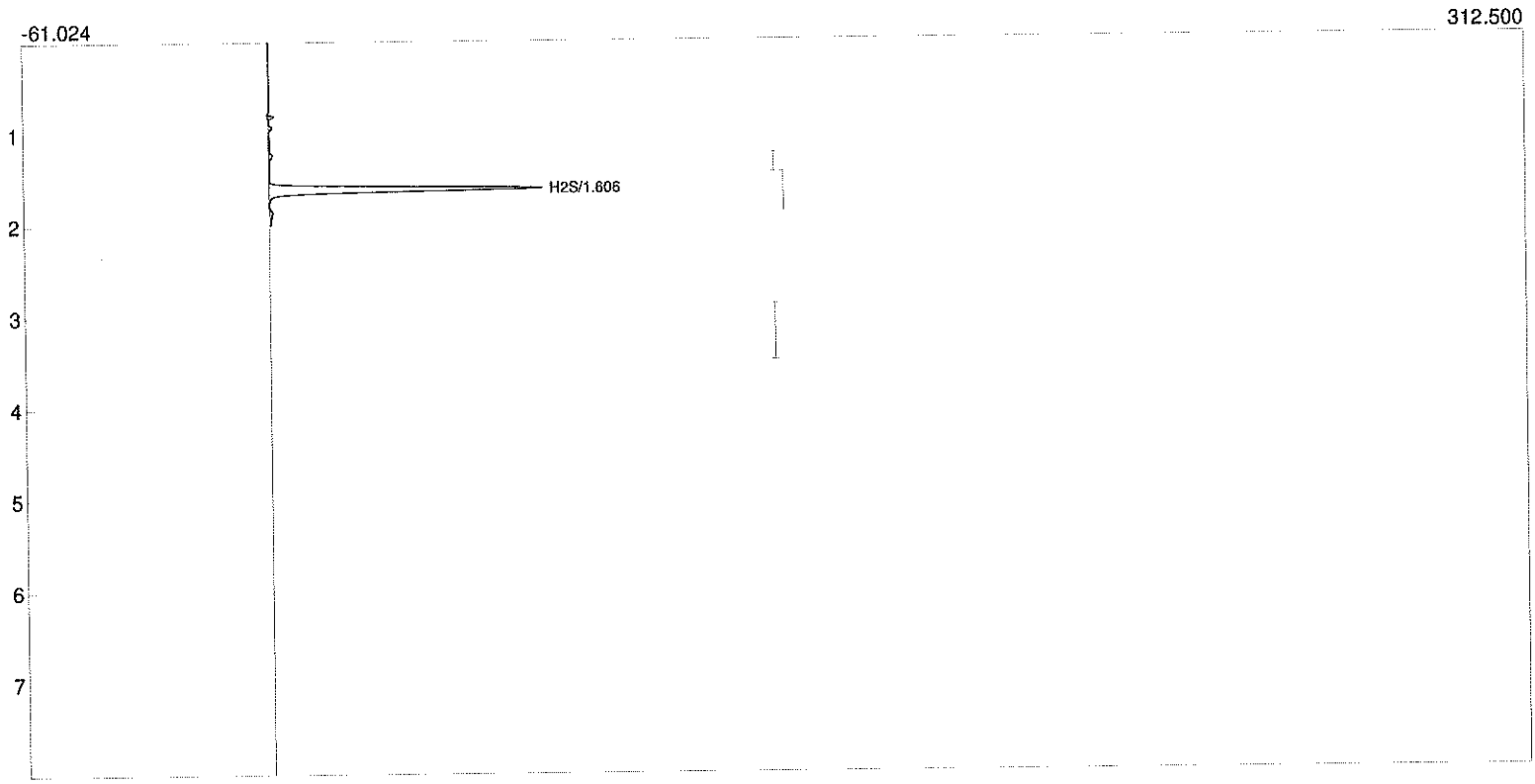
Component	Retention	External	Units
H2S	1.606	60.0116	
		60.0116	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_67.CHR ()
Sample: WF Run 9



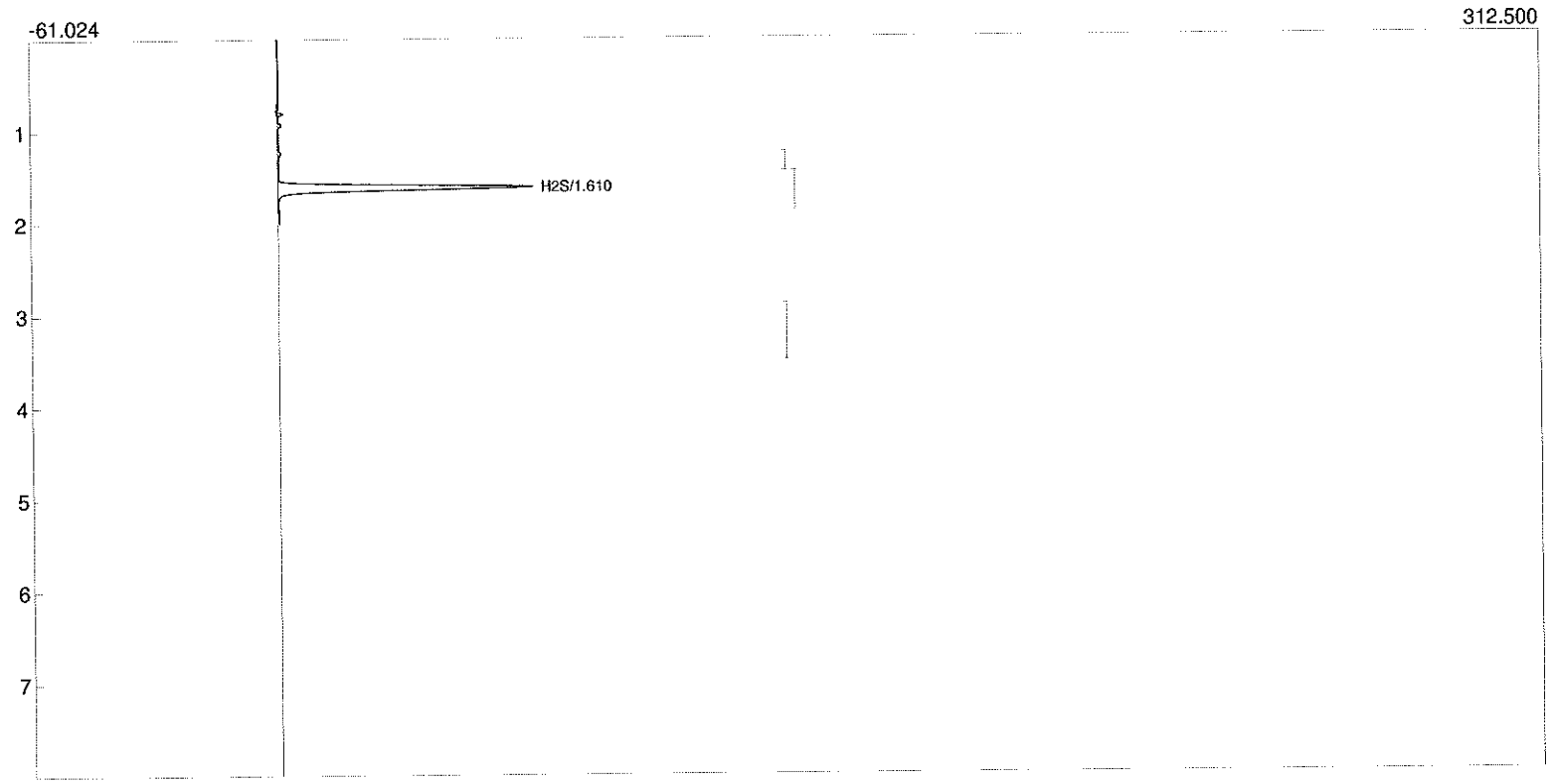
Component	Retention	External	Units
H2S	1.596	54.6067	
		54.6067	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_68.CHR ()
Sample: WF Run 10



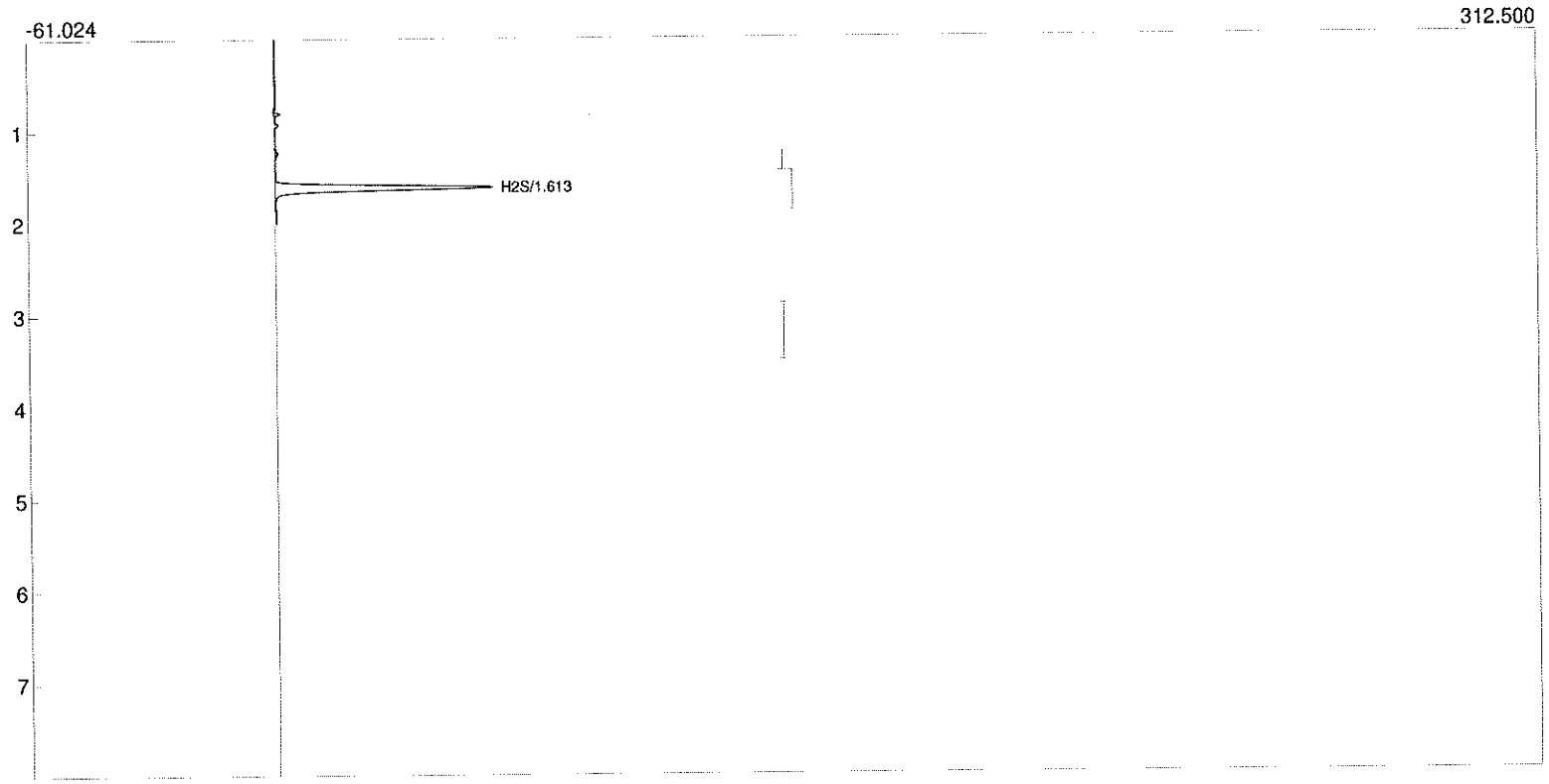
Component	Retention	External	Units
H2S	1.606	59.7123	
		59.7123	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_69.CHR ()
Sample: WF Run 11



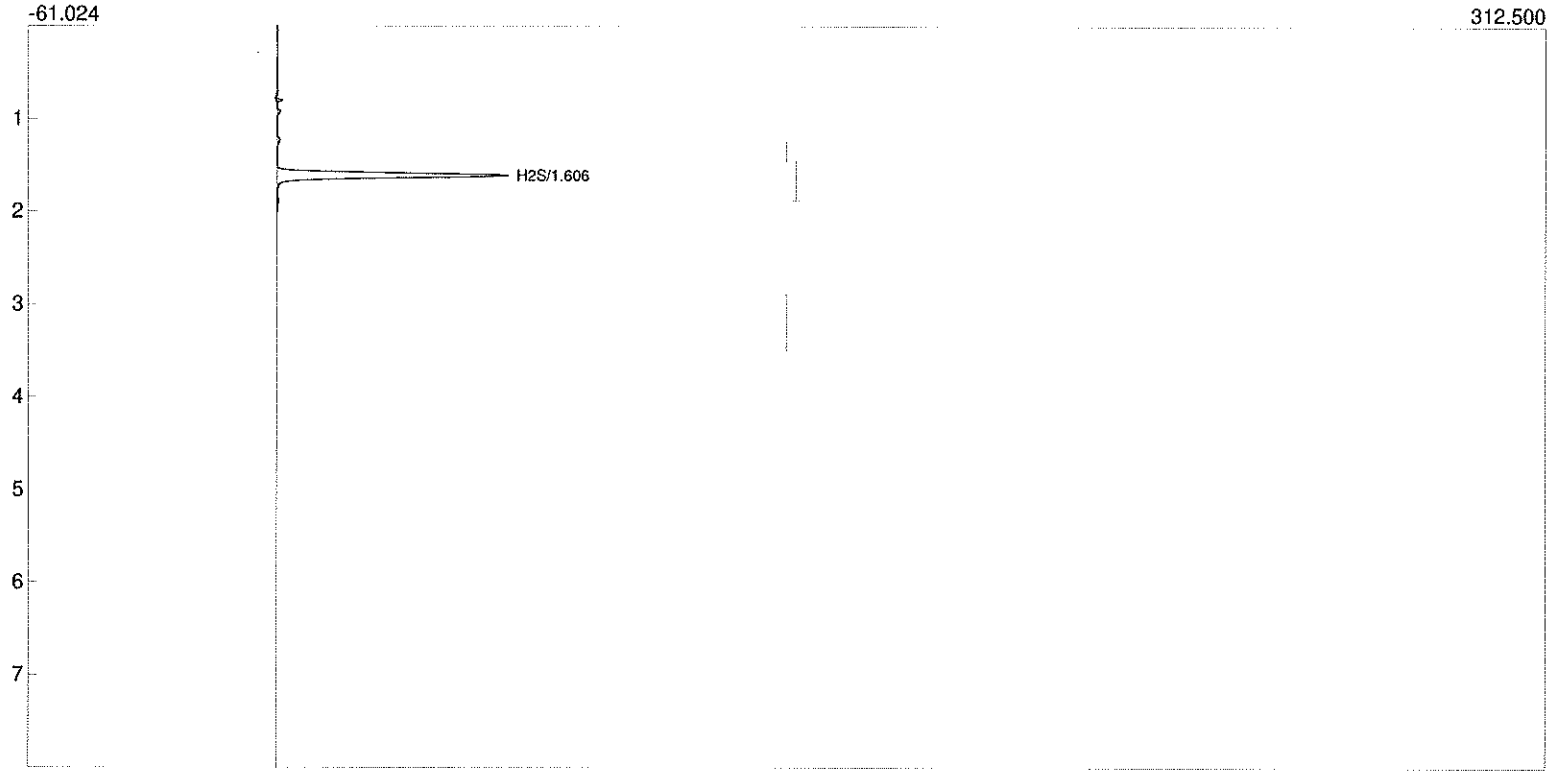
Component	Retention	External	Units
H2S	1.610	58.3909	
		58.3909	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_70.CHR ()
Sample: WF Run 12



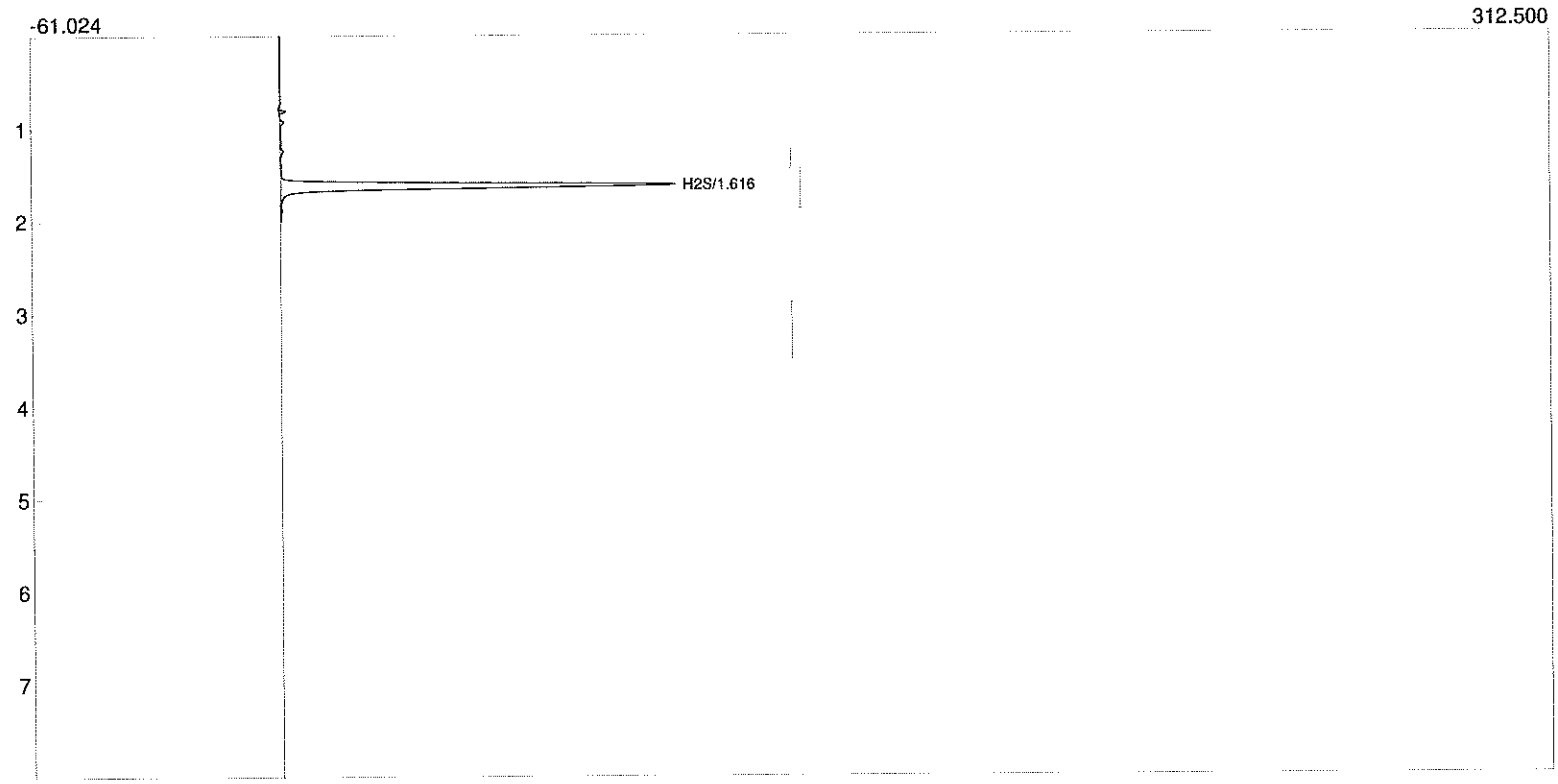
Component	Retention	External	Units
H2S	1.613	54.0102	
		54.0102	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_71.CHR ()
Sample: WF Run 13



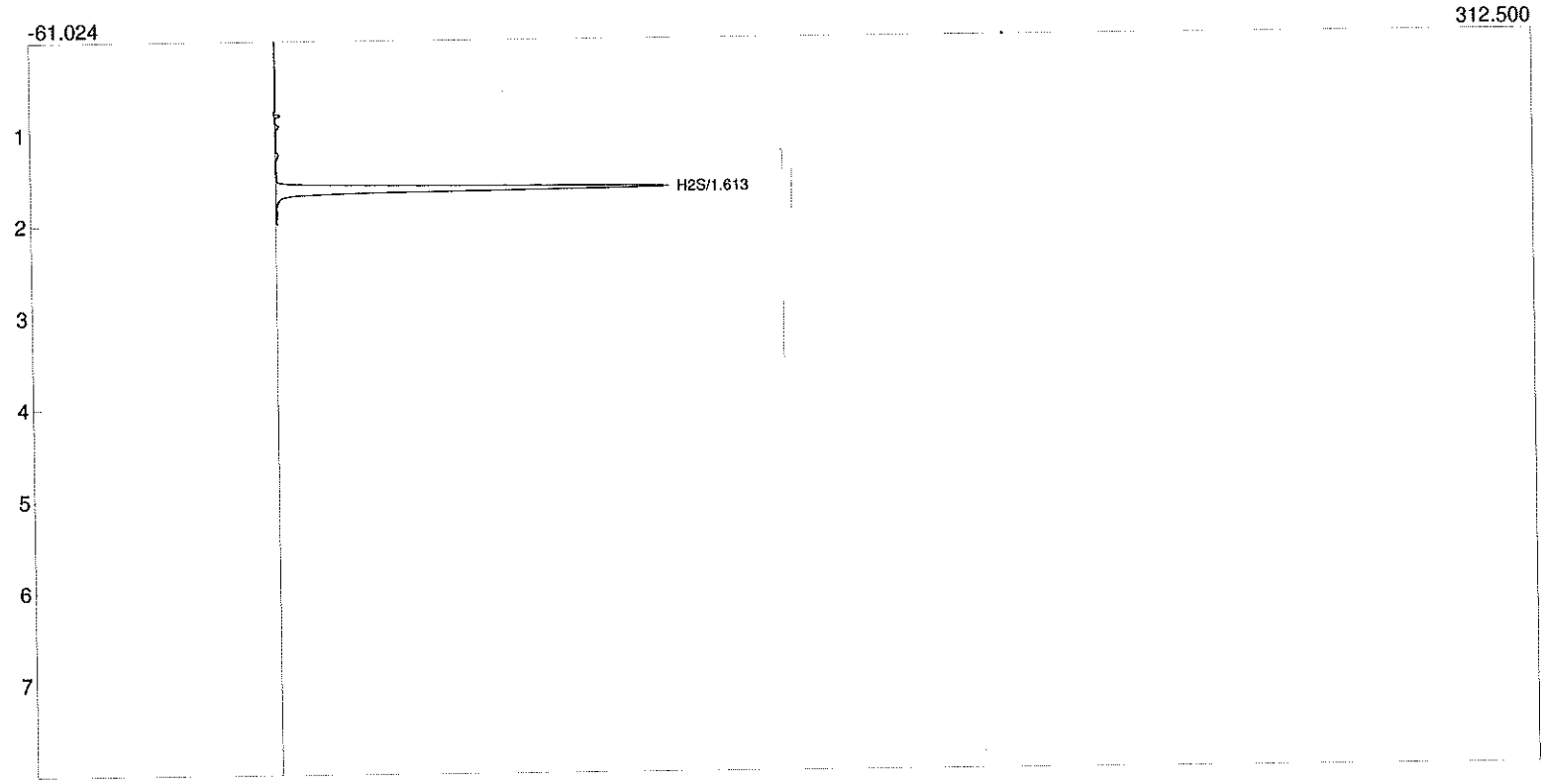
Component	Retention	External	Units
H2S	1.606	55.7525	
		55.7525	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_72.CHR ()
Sample: WF Run 14



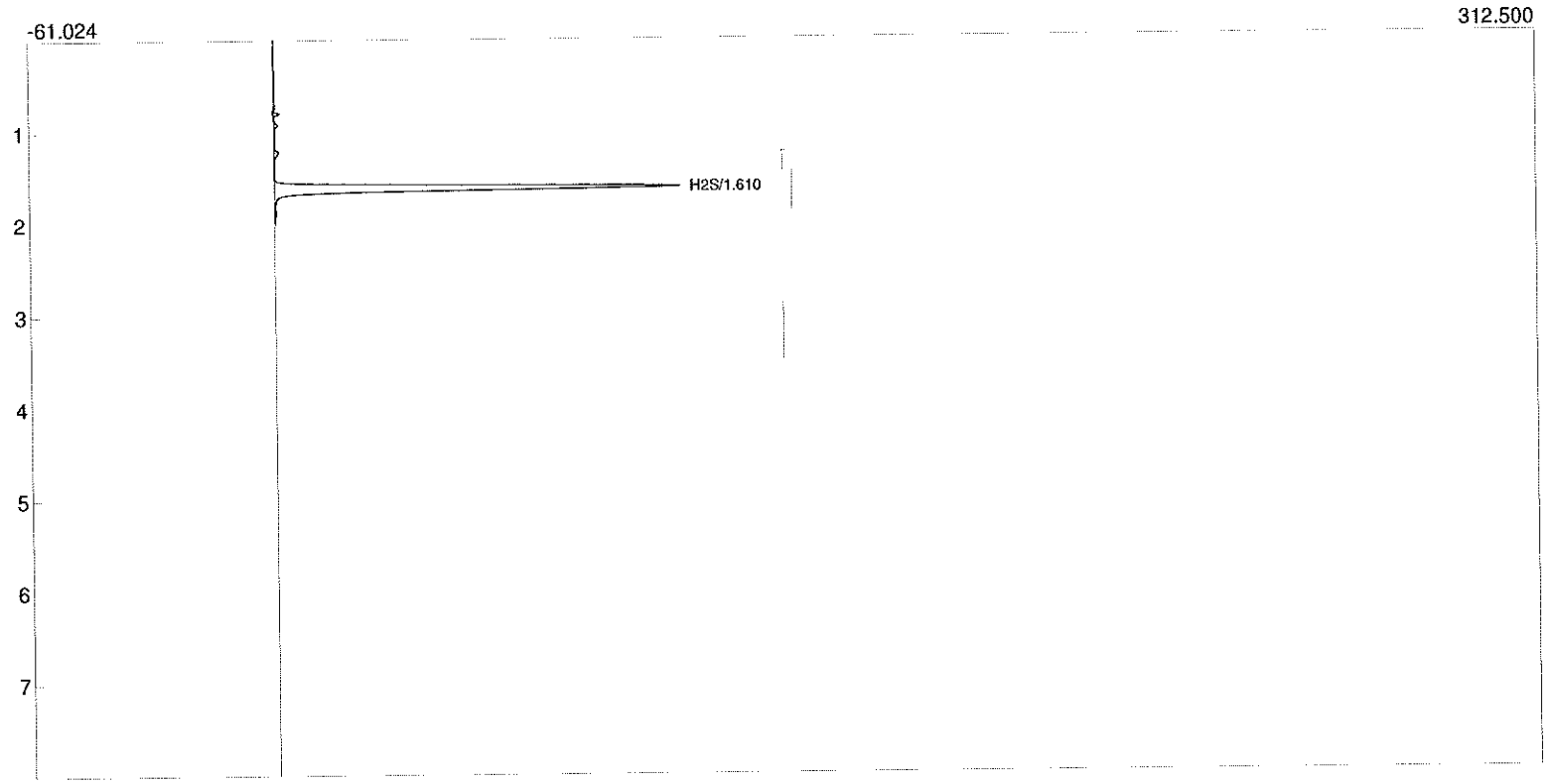
Component	Retention	External	Units
H2S	1.616	77.3538	
		77.3538	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_73.CHR ()
Sample: WF Run 15



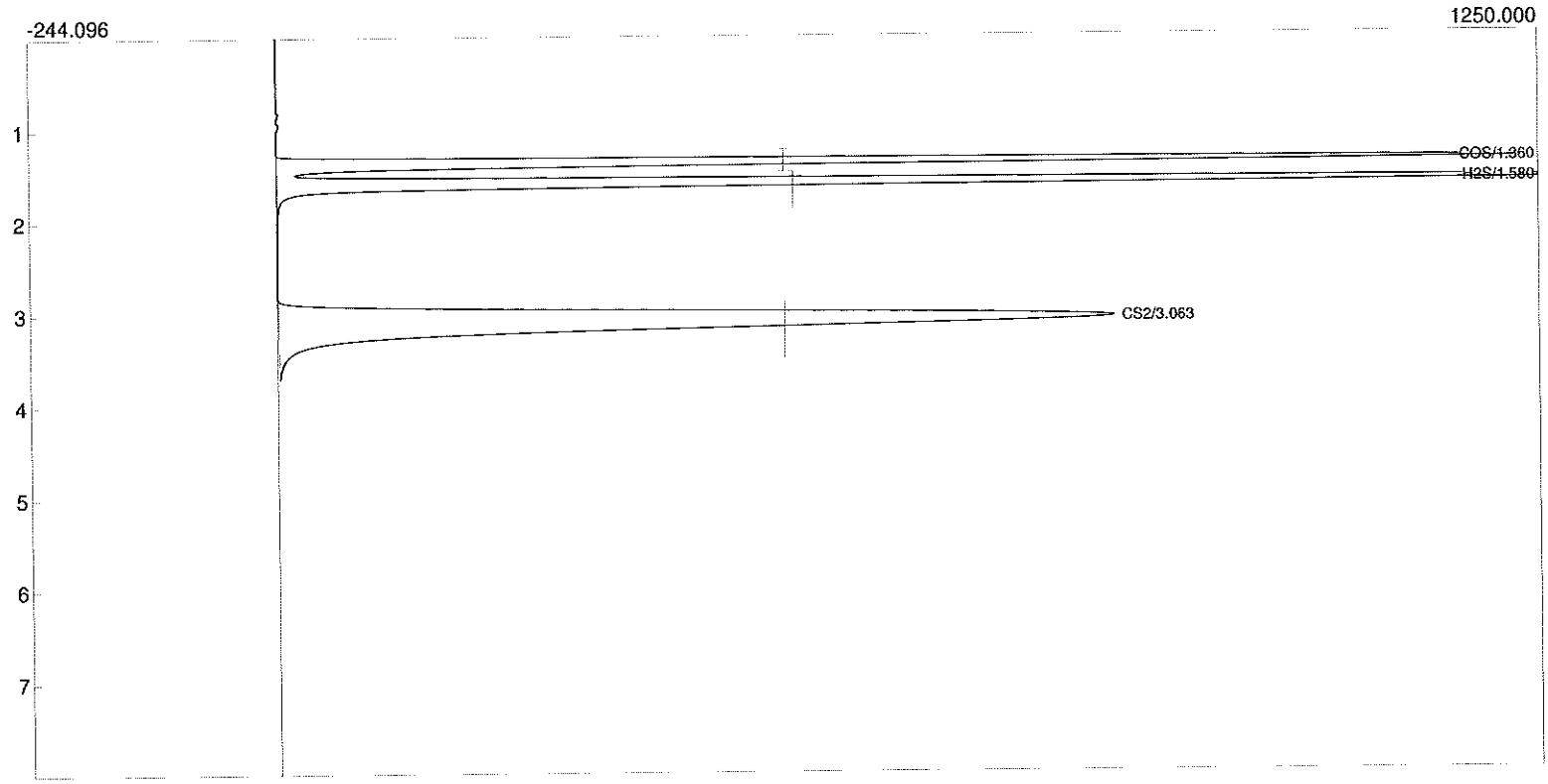
Component	Retention	External	Units
H2S	1.613	77.0237	
		77.0237	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_74.CHR ()
Sample: WF Run 16



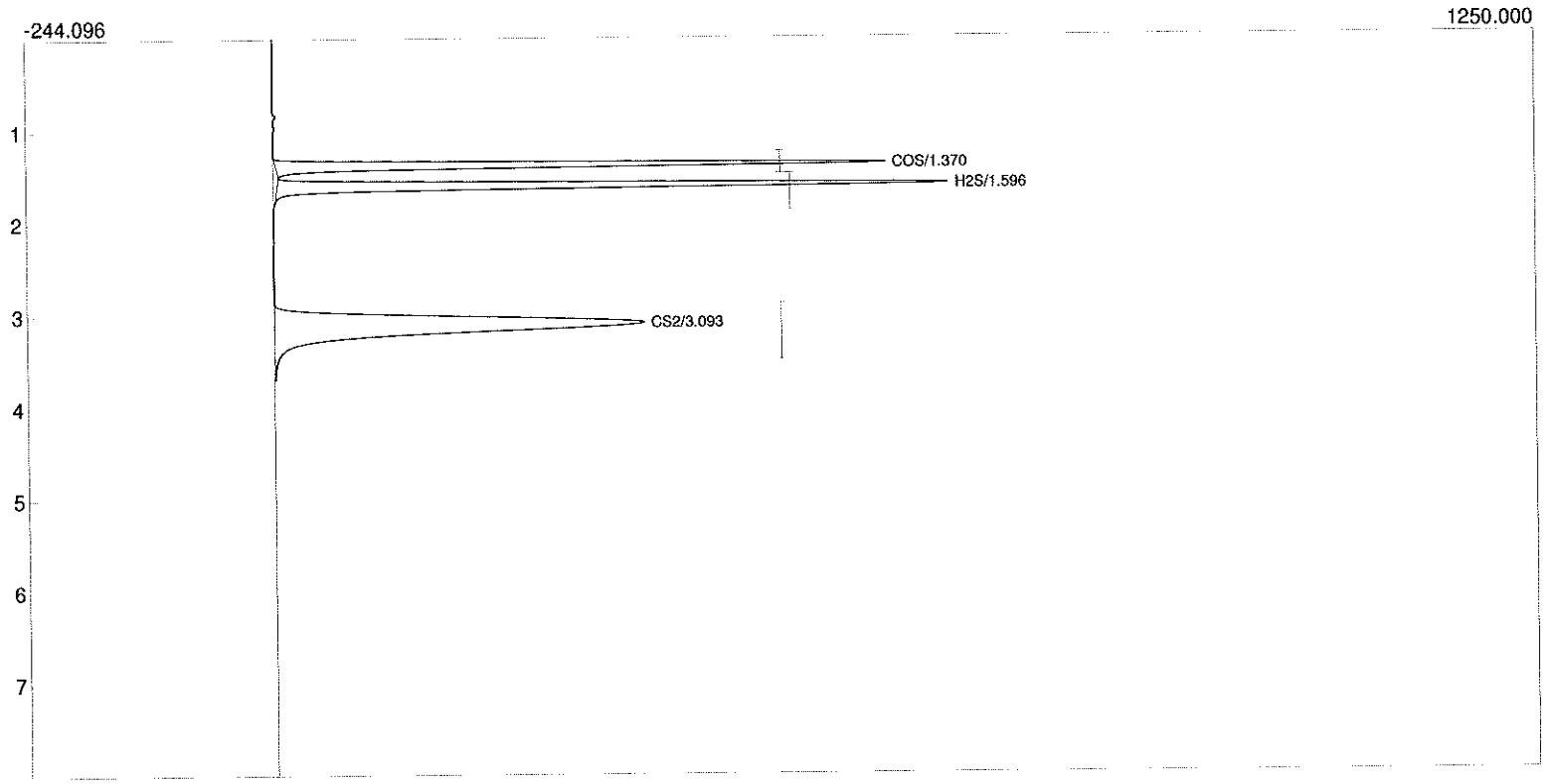
Component	Retention	External	Units
H2S	1.610	77.8991	
		77.8991	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_01.CHR ()
Sample: cal 488



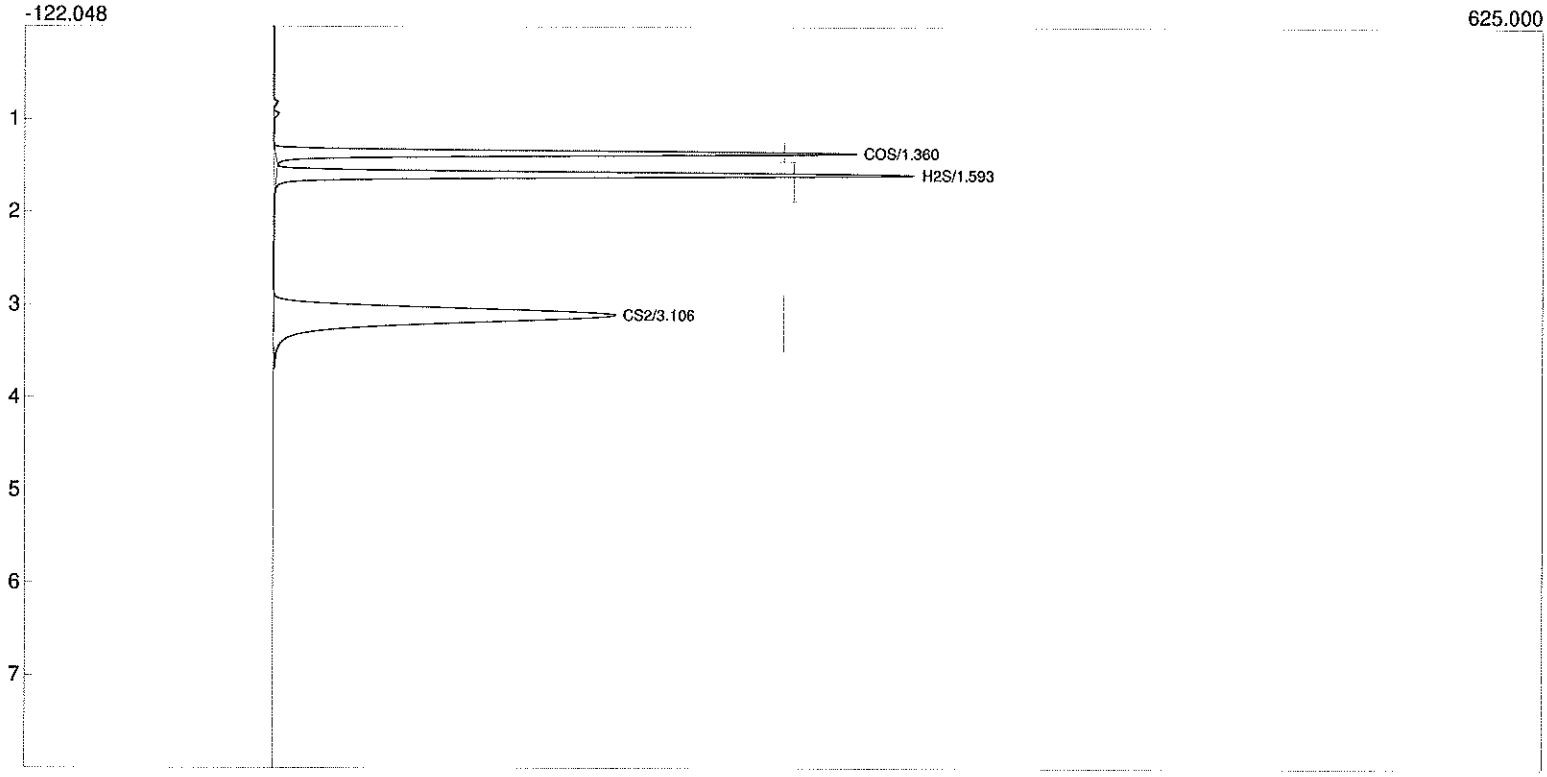
Component	Retention	External	Units
COS	1.360	481.1534	
H2S	1.580	488.1923	
CS2	3.063	509.4956	
		1478.8413	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_02.CHR ()
Sample: cal 244



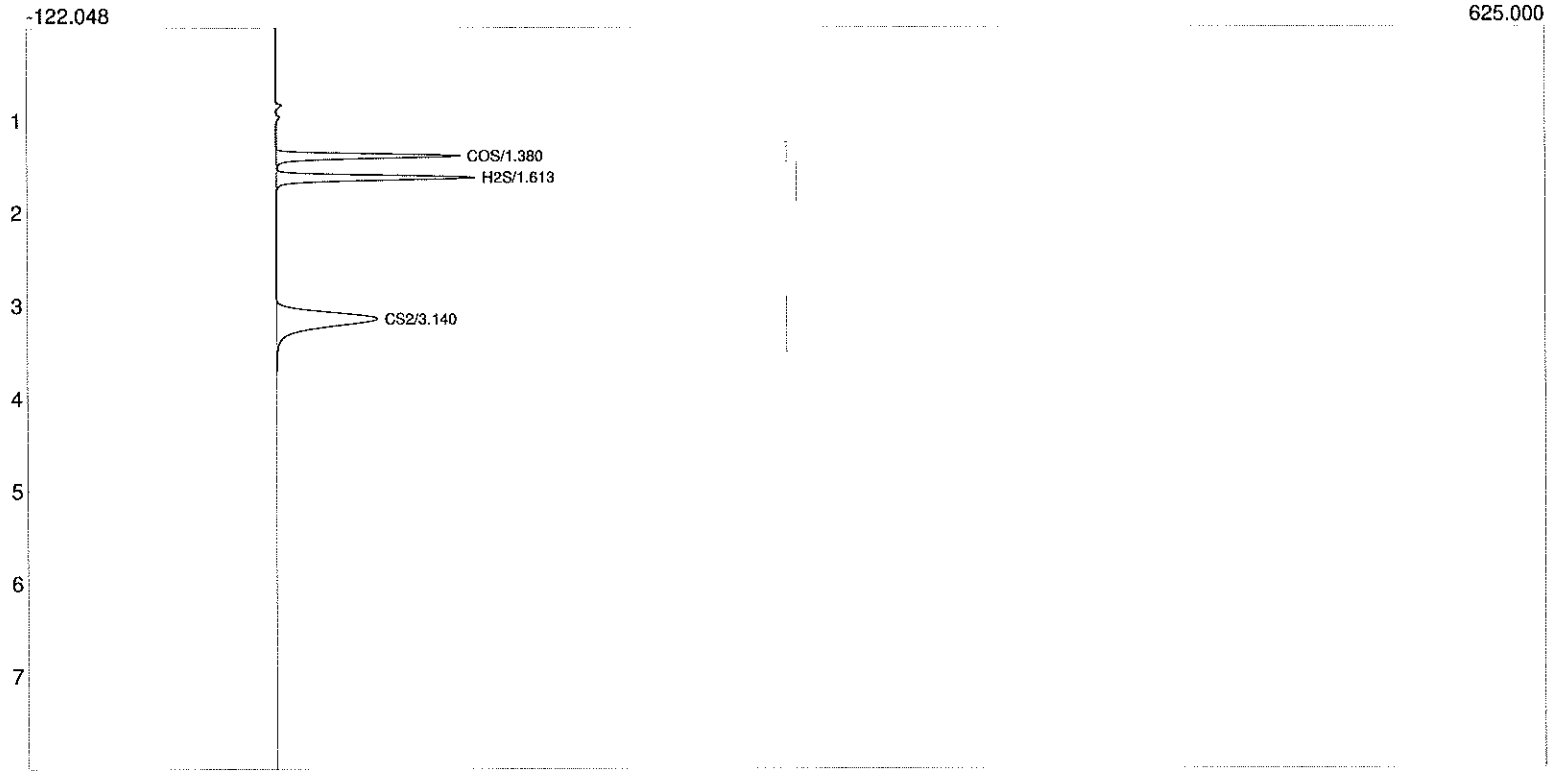
Component	Retention	External	Units
COS	1.370	240.6243	
H2S	1.596	244.0275	
CS2	3.093	254.7931	
		739.4450	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_03.CHR ()
Sample: cal 157



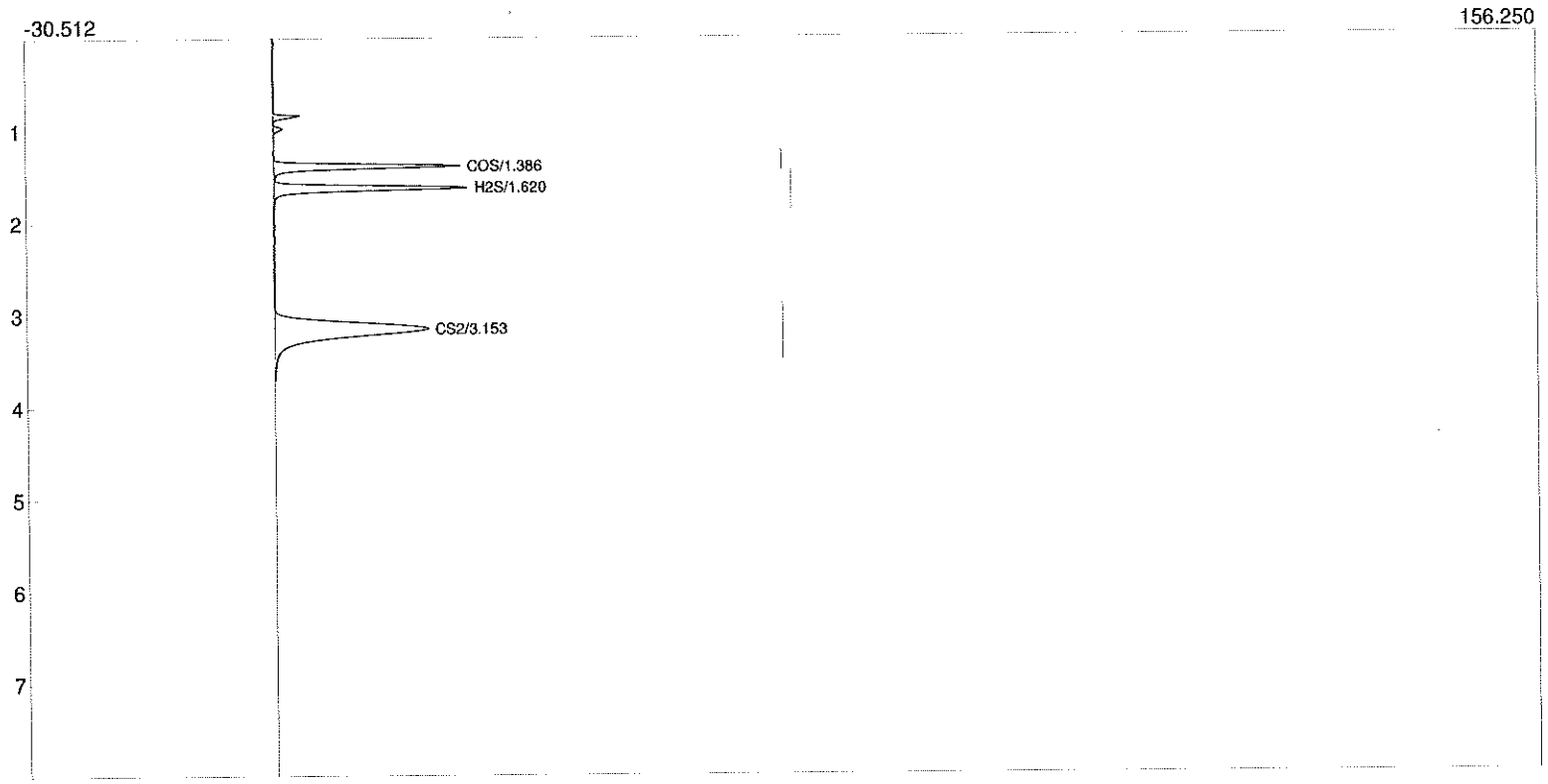
Component	Retention	External	Units
COS	1.360	157.4060	
H2S	1.593	154.6374	
CS2	3.106	161.3844	
		473.4277	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_04.CHR ()
Sample: cal 78



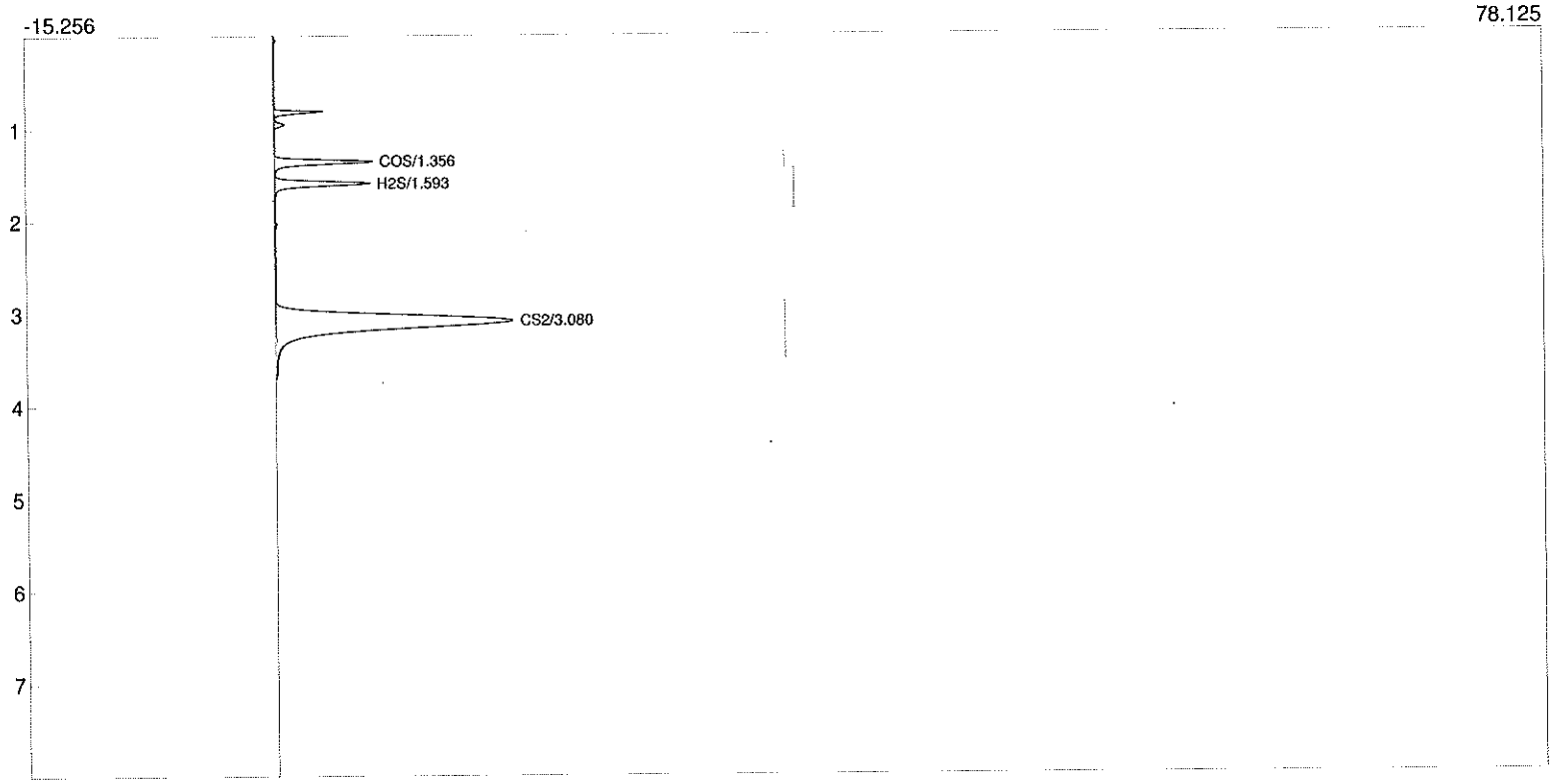
Component	Retention	External	Units
COS	1.380	78.7072	
H2S	1.613	77.3724	
CS2	3.140	80.7075	
		236.7871	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_05.CHR ()
Sample: cal 38



Component	Retention	External	Units
COS	1.386	39.3530	
H2S	1.620	38.6524	
CS2	3.153	40.4122	
		118.4176	

Lab name: DeNovo Global Technologies, Inc.
Client: CVREnergy - Wynnewood
Client ID: 5281.03.05
Collected: 11/29/2016
Method: Bag Sample
Description: FPD
Column: RESTEK 60 METER MXT-1
Carrier: Nitrogen 21 PSI
Data file: 5281_305_06.CHR ()
Sample: cal 19



Component	Retention	External	Units
COS	1.356	19.6283	
H2S	1.593	19.3106	
CS2	3.080	20.1660	
		59.1050	

APPENDIX B - West Flare Yokogawa GC 8000 H_2S CEMS Data

DeNovo Global Technologies, Inc.
CVREnergy - Wynnewod Refinery
West Flare CEMS Data
Date is: 11/29/2016

Timestamp	West Flare H2S - ppm	
13:30:00	73.84	
13:31:00	73.84	
13:32:00	70.40	
13:33:00	69.72	
13:34:00	69.73	
13:35:00	69.73	
13:36:00	69.73	
13:37:00	71.06	Run 1
13:38:00	71.32	
13:39:00	71.32	
13:40:00	71.32	
13:41:00	71.32	
13:42:00	71.71	
13:43:00	71.78	
13:44:00	71.78	
13:45:00	71.78	Run 2
13:46:00	71.78	
13:47:00	71.59	
13:48:00	71.55	
13:49:00	71.55	
13:50:00	71.55	
13:51:00	71.55	
13:52:00	72.89	
13:53:00	73.15	
13:54:00	73.15	
13:55:00	73.15	
13:56:00	73.15	
13:57:00	75.05	Run 3
13:58:00	75.44	
13:59:00	75.44	
14:00:00	75.44	
14:01:00	75.44	
14:02:00	74.86	
14:03:00	74.75	
14:04:00	74.75	
14:05:00	74.75	
14:06:00	74.75	Run 4
14:07:00	70.38	
14:08:00	69.50	
14:09:00	69.50	
14:10:00	69.50	
14:11:00	69.50	
14:12:00	71.77	
14:13:00	72.24	
14:14:00	72.24	
14:15:00	72.24	
14:16:00	72.24	
14:17:00	71.86	
14:18:00	71.79	
14:19:00	71.79	
14:20:00	71.78	

14:21:00	71.79	Run 5
14:22:00	68.75	
14:23:00	68.13	
14:24:00	68.13	
14:25:00	68.13	
14:26:00	68.13	
14:27:00	66.43	
14:28:00	66.08	
14:29:00	66.08	
14:30:00	66.08	
14:31:00	66.08	
14:32:00	70.97	
14:33:00	72.01	Run 6
14:34:00	72.01	
14:35:00	72.01	
14:36:00	72.01	
14:37:00	69.74	
14:38:00	69.27	
14:39:00	69.27	
14:40:00	69.27	
14:41:00	69.27	
14:42:00	72.09	
14:43:00	72.69	
14:44:00	72.70	
14:45:00	72.70	Run 7
14:46:00	72.70	
14:47:00	63.80	
14:48:00	61.91	
14:49:00	61.91	
14:50:00	61.91	
14:51:00	61.91	
14:52:00	65.35	
14:53:00	66.08	
14:54:00	66.08	
14:55:00	66.08	
14:56:00	66.08	
14:57:00	67.21	Run 8
14:58:00	67.45	
14:59:00	67.45	
15:00:00	67.45	
15:01:00	67.45	
15:02:00	69.14	
15:03:00	69.50	
15:04:00	69.50	
15:05:00	69.50	
15:06:00	69.50	
15:07:00	69.31	
15:08:00	69.27	
15:09:00	69.27	Run 9
15:10:00	69.27	
15:11:00	69.27	
15:12:00	64.95	
15:13:00	64.03	
15:14:00	64.03	
15:15:00	64.03	
15:16:00	64.03	
15:17:00	64.40	
15:18:00	64.48	
15:19:00	64.48	
15:20:00	64.48	

15:21:00	64.48	Run 10
15:22:00	66.74	
15:23:00	67.22	
15:24:00	67.22	
15:25:00	67.22	
15:26:00	67.22	
15:27:00	64.16	
15:28:00	63.51	
15:29:00	63.51	
15:30:00	63.51	
15:31:00	63.51	
15:32:00	64.50	
15:33:00	64.71	
15:34:00	64.71	
15:35:00	64.71	
15:36:00	64.71	
15:37:00	56.95	
15:38:00	55.29	
15:39:00	55.30	
15:40:00	55.29	
15:41:00	55.30	
15:42:00	57.37	
15:43:00	57.81	
15:44:00	57.81	
15:45:00	57.81	Run 11
15:46:00	57.81	
15:47:00	58.94	
15:48:00	59.18	
15:49:00	59.18	
15:50:00	59.18	
15:51:00	59.18	
15:52:00	60.31	
15:53:00	60.54	
15:54:00	60.54	
15:55:00	60.55	
15:56:00	60.55	
15:57:00	61.30	Run 12
15:58:00	61.46	
15:59:00	61.46	
16:00:00	61.45	
16:01:00	61.45	
16:02:00	63.15	
16:03:00	63.51	
16:04:00	63.51	
16:05:00	63.51	
16:06:00	63.51	
16:07:00	63.32	
16:08:00	63.28	
16:09:00	63.28	Run 13
16:10:00	63.28	
16:11:00	63.28	
16:12:00	65.97	
16:13:00	66.53	
16:14:00	66.53	
16:15:00	66.53	
16:16:00	66.53	Run 14
16:17:00	66.35	
16:18:00	66.31	
16:19:00	66.31	
16:20:00	66.31	
16:21:00	66.31	
16:22:00	64.99	Run 15
16:23:00	64.71	
16:24:00	64.71	
16:25:00	64.71	
16:26:00	64.71	
16:27:00	67.53	
16:28:00	68.13	
16:29:00	68.13	
16:30:00	68.13	
16:31:00	68.13	Run 16
16:32:00	57.54	
16:33:00	55.30	

APPENDIX C - Gas Calibration Certificates / Support Documentation

Airgas
an Air Liquide company

Airgas USA, LLC
616 Miller Cut Off Rd.
LaPorte, TX 77571
281-842-6900
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: PRIMARY STANDARD

Customer: DENOVO GLOBAL TECHNOLOGIES INC - LA PORTE , TX
Part Number: X05ME78P33A0000
Cylinder Number: FF48905
Laboratory: 124 - LaPorte Mix (SAP) - TX
Analysis Date: Oct 19, 2016
Lot Number: 126-400785023-1

Reference Number: 126-400785023-1
Cylinder Volume: 31.7 CF
Cylinder Pressure: 1606 PSIG
Valve Outlet: 330

Expiration Date: Oct 19, 2017

Primary Standard Gas Mixtures are traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration (Mole %)	Analytical Uncertainty
CARBON DISULFIDE	150.0 PPM	161.4 PPM	+/- 1%
CARBONYL SULFIDE	150.0 PPM	157.4 PPM	+/- 1%
HYDROGEN SULFIDE	150.0 PPM	154.7 PPM	+/- 1%
ETHANE	21.00 %	21.01 %	+/- 1%
METHANE	Balance		

Notes:
RECERTIFICATION
DENOVO GLOBAL TECHNOLOGIES INC
PO#: RECERT 9/29/2016

Approved for Release

Airgas

Airgas USA, LLC
616 Miller Cut Off Road
Laporte, TX 77571
281-842-6900
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: CERTIFIED STANDARD-SPEC

Customer:	DENOVO GLOBAL TECHNOLOGIES INC - LAPORTE, TX		
Part Number:	X05ME78C33A0040	Reference Number:	126-400732979-1
Cylinder Number:	FF37344	Cylinder Volume:	42 CF
Laboratory:	ASG - LaPorte Mix (SAP) - TX	Cylinder Pressure:	2015 PSIG
Analysis Date:	Jul 05, 2016	Valve Outlet:	330
Lot Number:	126-400732979-1		

Expiration Date: Jul 05, 2017

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

ANALYTICAL RESULTS

Component	Req Conc	Actual Concentration (Mole %)	Analytical Uncertainty
CARBON DISULFIDE	500.0 PPM	509.6 PPM	+/- 2%
CARBONYL SULFIDE	500.0 PPM	481.2 PPM	+/- 2%
HYDROGEN SULFIDE	500.0 PPM	488.2 PPM	+/- 2%
ETHANE	21.00 %	21.02 %	+/- 2%
METHANE	Balance		

Notes:.
PO# DGT-7305

Approved for Release

APPENDIX D - Example Calculations

EXAMPLE CALCULATIONS

Correction for raw emission concentrations to bias/drift corrected values:

Eq. 1: C SUB corrected = (C SUB measured - C SUB o) C SUB ma OVER { C SUB m - C SUB o }

where:

$C_{corrected}$ = Average calibration corrected concentration, ppm or percent

$C_{measured}$ = Average measured concentration, ppm, or percent

C_O = Average of pre- and post-test system bias response for the zero gas, ppm or percent

C_m = Average of pre- and post-test system bias response for the upscale gas, ppm or percent

C_{ma} = Actual concentration of the upscale gas, ppm or percent

Relative Accuracy Calculation:

Eq. 2: D = 1 OVER n n OVER φ OVER { i=1 } di

where:

D = Arithmetic mean of the difference between the RM and CEMS value

n = Number of data points

di = Difference between the RM and CEMS for individual data points

Standard Deviation Calculation:

Eq. 3: S SUB d = [{ { n OVER φ OVER {i=1 }d SUB i SUP 2 }- { (n OVER φ OVER {i=1 }d SUB i) SUP 2 } OVER n } OVER { n-1 }] SUP { 1/2 }

where:

Sd = Standard deviation of the difference between the RM and CEMS value

Confidence Coefficient Calculation:

Eq. 4: CC = t SUB { 0.975 } S SUB d OVER SQRT n

where:

CC = Two Tailed confidence coefficient corresponding to 2.5% error

$t_{0.975}$ = t-value correcting for –1 degrees of freedom = 2.306

Relative Accuracy of CEMS to RM Calculation:

Eq. 5: RA = { |D| + |CC| } OVER RM * 100%

where:

RA	=	Relative accuracy of the CEMS system to the RM
D	=	Absolute value of the mean of the differences
CC	=	Absolute value of the confidence coefficient
RM	=	Average RM value or the applicable emission standard

Emission Rate Calculation lbs/MMBtu:

FUNC { E~=~C_corrected`~MW over {385.33*10^6}~`F_d`{{20.9} over {(20.9`-`%O_{2d})}}}

Where:

E	=	Pollutant emission rate, ng/J (lbs/million Btu).
$C_{corrected}$	=	Average calibration corrected concentration, ppm or percent
MW	=	Molecular weight of compound, lbs/lb-mol
F_d	=	Volume of combustion components per unit of heat content, scm/J (scf/million Btu).
$\%O_{2d}$	=	Concentration of oxygen on a dry basis, percent.

APPENDIX E - Quality Assurance / Quality Control

QUALITY ASSURANCE / QUALITY CONTROL

Specific quality control measures were used to insure the generation of reliable data from all sampling and analysis activities. Proper collection and organization of information followed by clear and concise reporting of the data was a primary goal in the project.

The objective of a quality assurance/quality control (QA/QC) program is to ensure that the precision and accuracy of all environmental data generated by DeNovo Global Technologies, Inc. is commensurate with data quality objectives (DQOs). DQOs are based on a common understanding of the intended end use(s) of the data, the measurement process, and the availability of resources. Once DQOs are established, formally or informally, QC protocol can be defined for the measurements.

In this project, the final data users will be Wynnewood Refining Company, USEPA Region VI, and the State of Oklahoma. The DQOs for this project are to generate legally defensible data to be used to demonstrate 40 CFR Part 60 and Part 63 compliance.

Two basic goals of a QC program are to:

1) Control errors; and
2) Verify that the entire analytical method is operating within acceptable performance limits.

Use of qualified personnel, reliable and well-maintained equipment, appropriate calibrations and standards, and close supervision of all operations are important components of the QC program. The following sections describe the QC results for maintaining instruments and equipment in a state of calibration (defines the accuracy or bias error), results for measuring a continuously maintained state of cleanliness (eliminates interference or contamination), and the paper trail which documents that the methods were performed to instructions, calibrated within method performance standards, and/or traceable to National Technical Information Services (NTIS) standard reference materials. Standards of QA set forth in the Quality Assurance Handbook for Air Pollution Measurements Systems, Volume III (USEPA-600/4-77-027b) were strictly followed.

FIELD DATA REDUCTION

Example calculations are used in the field to check on sampling conditions and a list of formulas used to reduce the field data. The data collected was reviewed in the field by the Project Manager. Errors or discrepancies were noted on the data sheet. Appendices of this report present the standardized forms that were used to record field sampling data.

INTERNAL QC CHECKS AND FREQUENCY

QC checks were performed to ensure the collection of representative samples and the generation of valid analytical results of these samples. These checks were performed by project participants throughout the program.

QA PROCEDURES

The following QA procedures were implemented during this test program:

- Use of designated sampling and analytical equipment. The sampling equipment used in this test met all calibration and operating criteria of the applicable ODEQ and USEPA Methods.

- Sampling system was calibrated and operated according to ODEQ and USEPA documented procedures. All site activities including audit results were logged into the daily site book.

- Equipment calibration - The mobile sampling equipment is calibrated with two concentrations of USEPA Protocol 1 gasses and a zero gas before the first test. Calibration span setting are check after each run. Other test equipment is calibrated in accordance with USEPA specifications in Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III (USEPA-600/4-77-027b).

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JAN 26 2017 /[handwritten initials] rec'd for [illegible]

RECEIVED US EPA ASSOCIATE DIRECTOR

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

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SCOTT A. THOMPSON
Executive Director

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

MARY FALLIN
Governor

COMPLIANCE ASSURANCE & ENFORCEMENT DIV.

January 20, 2016

AI / AI / CO

CERTIFIED MAIL, RETURN RECEIPT REQUESTED

LeAnn Johnson Koch
Perkins Coie LLP
700 Thirteenth Street NW, Suite 600
Washington, DC 20005-3960

Re: Wynnewood Refining Company, LLC's Extension Requests for Performance Tests

Dear Ms. Johnson:

The purpose of this letter is to respond to Wynnewood's request dated March 18, 2016 (and additional information provided on October 28, 2016), for clarification regarding the performance test for flares and for an extension of the deadlines to conduct performance tests for FCCUs both required by EPA's Refinery Sector Rule ("RSR") (80 Fed. Reg. 75178). On December 1, 2015, EPA published the RSR with an effective date of February 1, 2016. For the reasons set forth in Wynnewood's request and summarized below, the Department of Environmental Quality ("DEQ") has provided the requested clarification and determined that Wynnewood's extension request should be granted in accordance with Clean Air Act § 112(i)(3)(B) and 40 C.F.R. § 63.6(i)(3).

The federal Clean Air Act and U.S. EPA's implementing regulations allow the DEQ, as the State agency with an approved Title V permitting program, to "grant[] an extension permitting an existing source up to one (1) additional year to comply with standards . . . if such additional period is necessary for the installation of controls." *See* 42 U.S.C. §§ 7412(i)(3)(B*)* and 7412(f)(4)(B)*; see also* 40 C.F.R. § 63.6(i)(4)(i)(A).

Flare Performance Tests

Wynnewood requests that DEQ clarify or extend the deadline for flare performance testing. Flare performance testing is required under NSPS, Subpart Ja to demonstrate initial compliance with the 162ppm H_2S concentration standard in 40 C.F.R. § 60.103a(h). In the preamble to the RSR, EPA indicated that it was "providing 18 months after the effective date of the final rule [until August 1, 2017] to conduct required performance tests and comply with any revised operating limits for FCCU." 80 Fed. Reg. 75186. However, the August 1, 2017 deadline was not incorporated into NSPS, Subpart Ja. Rather, the rule requires refiners to conduct flare

performance tests to demonstrate initial compliance according to the schedule in 40 C.F.R. § 60.8. *See* 40 C.F.R. § 60.104a(a).

Pursuant to 40 C.F.R. § 60.8, performance tests must be completed "within 60 days after achieving the maximum production rate at which the affected facility will be operated but not later than 180 days after initial startup of" the facility. Wynnewood cannot perform the test on this schedule because the deadlines apply when an affected facility is constructed, modified, or reconstructed, not when a rule is amended.

Regardless, Wynnewood asserts that the refinery has already satisfied the performance testing requirements of 40 C.F.R. § 60.104a(a) and (j). The flare performance test requirement in 40 C.F.R. § 60.104a(j) requires that a compliance determination be performed (either in accordance with Reference Method 11, 15 or 15A). Wynnewood has already conducted tests to determine compliance on each of its NSPS subpart Ja flares, in accordance with the performance evaluation requirements of 40 C.F.R. § 60.107a(a)(2)(ii) and Reference Method 11. Each flare passed the evaluation.

Therefore, because Wynnewood successfully completed its performance evaluations using the same methods as required by the performance testing obligation in the RSR, each flare has already "determine[d] compliance with the applicable . . . concentration requirement in § 60.103a(h)." *See* 40 C.F.R. Part 60, Subpart Ja, § 60.104a(j). DEQ has determined that the H_2S compliance evaluations performed in accordance with 40 C.F.R. § 60.107a(a)(2) satisfy the requirements of 40 C.F.R. § 60.104a(a) and (j) and the RSR.

FCCU Performance Tests

FCCU performance tests are required under NESHAP, Subpart UUU for PM and HCN. 40 C.F.R. § 63.1571 states that performance tests of catalytic cracking units must be conducted and reported within 150 days after the compliance date specified for the source in § 63.1563, but no compliance date is identified in § 63.1571. In the preamble to the RSR, EPA indicated that compliance tests should be completed by August 1, 2017. Therefore, Wynnewood must conduct and report the results of its FCCU performance tests within 150 days of the August 1, 2017 compliance date. However, during the Fall of 2017, Wynnewood plans to be in the middle of a turnaround, therefore the FCCU will not be operating or will be in the process of being shut down. During the turnaround, the refinery intends to make improvements to the FCCU through changes to the electrostatic precipitator, which will likely lead to emission reductions. Wynnewood has already installed emission controls, and the planned changes will result in improvements to those emission reduction technology systems. Accordingly, Wynnewood has requested a 90-day extension to conduct and report the results of its PM and HCN performance tests on its FCCU by March 30, 2018.

EPA has explained that 40 C.F.R. § 63.6 is intended to allow for extensions for "other compliance measures requiring time beyond which [was] anticipated in establishing the compliance date," not just for the physical installation of controls. *See* 66 Fed. Reg. 16,318, 16,328. "Other compliance measures" include "obtaining or implementing technology hardware or software systems and process changes to accommodate pollution prevention or other emission

reduction measures." *Id.* DEQ has determined that the changes Wynnewood plans to make to the electrostatic precipitator fall under the category of "other compliance measures" that EPA has outlined.

U.S. EPA's implementing regulations require a request for extension to include: a description of the controls to be installed to comply with the standard; and a compliance schedule. *See* 40 C.F.R. § 63.6(i)(6)(i). In addition, the compliance schedule is required to include the date by which installation of the emission control equipment will commence and the date by which final compliance will be achieved. *See id.* Wynnewood's request identifies the need for the requested extension as being to make upgrades to control equipment and other improvements to emission reduction technology systems, including changes to the electrostatic precipitator. The request also identifies a schedule for beginning installation, construction, or process change as well as final compliance dates.

Regarding the flare performance test, after review of the applicable regulations and the RSR in addition to the information that Wynnewood has submitted, DEQ confirms that Wynnewood's previous flare performance tests have satisfied the requirement in the RSR and 40 C.F.R. § 60.104a. Regarding the FCCU performance tests, DEQ agrees that the circumstances upon which Wynnewood's extension request are based are consistent with the range of circumstances justifying an extension. Based on the information provided in Wynnewood's request, the agency has determined that an extension of the compliance dates as set forth above is warranted. Should the schedule for Wynnewood's Fall 2017 turnaround change, thus making it not possible for Wynnewood to conduct and report the results of the performance tests by March 30, 2018, Wynnewood will notify DEQ and may seek to modify this extension.

As part of the extension process provided in EPA's regulations, "[t]he owner or operator of an affected source who has requested an extension of compliance under this paragraph . . . [is required to] apply to have the source's title V permit revised to incorporate the conditions of the extension of compliance." 40 C.F.R. § 63.6(i)(4)(i)(A). Once an administratively complete application for permit modification is received, DEQ may take the necessary steps to incorporate the extension into Wynnewood's permit. Thank you for your request and the information provided. If you have any questions or concerns, please do not hesitate to contact Laura Finley at (405) 702-7189.

Sincerely,

Eddie Terrill
Air Quality Division Director

cc: Ron Curry, Regional Administrator
U.S. Environmental Protection Agency, Region 6
1445 Ross Avenue, Suite 1200

Dallas, Texas 75202-2733

Robert Morris
Wynnewood Refining Company, LLC
P.O. Box 305
906 South Powell
Wynnewood, OK 73098

AI / AI / CO

II 0000453697

WYNNEWOOD REFINING™
A CVR Energy, Inc. Company

January 27, 2017

RETURN RECEIPT REQUESTED
CERTIFIED MAIL

Mrs. Heather Sessing
Oklahoma Department of Environmental Quality
Air Quality Division
PO Box 1677
Oklahoma City, OK 73101-1677

Subject: SMR HEATER CEMS RATA Notification
Permit No. 201-26-TVR (M-17)

Dear Mrs. Sessing:

The purpose of this letter is to inform ODEQ that WRC intends on performing the annual QA RATA on the steam methane reformer (SMR) during the week of March 6, 2017. In accordance with our permit, WRC is submitting this notice to provide the required 30-days' notice.

If someone from your office would like to attend either the RATA or performance test, or if you have any questions please contact David Heller at (405) 665-6526.

Sincerely,

Curtis Miles
Environmental Manager

cc: US EPA, Mr. John Blevins, 1445 Ross Avenue, Suite 1200 Dallas, Texas 75202
R. Morris (electronic)
J. Develasco (electronic)

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& ENFORCEMENT DIV.

WYNNEWOOD REFINING™
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January 31, 2017

RETURN RECEIPT REQUESTED
CERTIFIED MAIL
7015 1520 0001 9454 8743

Ms. Holly Taber
Oklahoma Department of Environmental Quality
Air Quality Division
PO Box 1677
Oklahoma City, OK 73101

Subject: 30-day Notification Tank Seal Inspections
Notification for March 2017 inspections
Wynnewood Refining Company, LLC
Permit No. 2007-026-TVR (M-16)

Dear Ms. Taber:

The purpose of this letter is to inform DEQ that WRC plans on conducting six secondary seal inspections for the month of March 2017.

1. Tank 1470 EFR
2. Tank 144 EFR
3. Tank 140 EFR
4. Tank 110 EFR
5. Tank 250 EFR
6. Tank 168 EFR

If you have any questions, please contact me at (405) 665-6571.

Sincerely,

Kevin Callan
Environmental Technician

cc: US EPA, Mr. John Blevins, 1445 Ross Avenue, Suite 1200 Dallas, TX 75202
Ms. Janice DeVelasco, VP of EH&S, 2277 Plaza Drive, Suite 500, Sugar Land, TX 77479
Mr. Robert Morris, Director of Environmental Affairs, PO Box 305, Wynnewood, OK 73098